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F. Martin, M. Pitteroff, T. Pross (ed.)

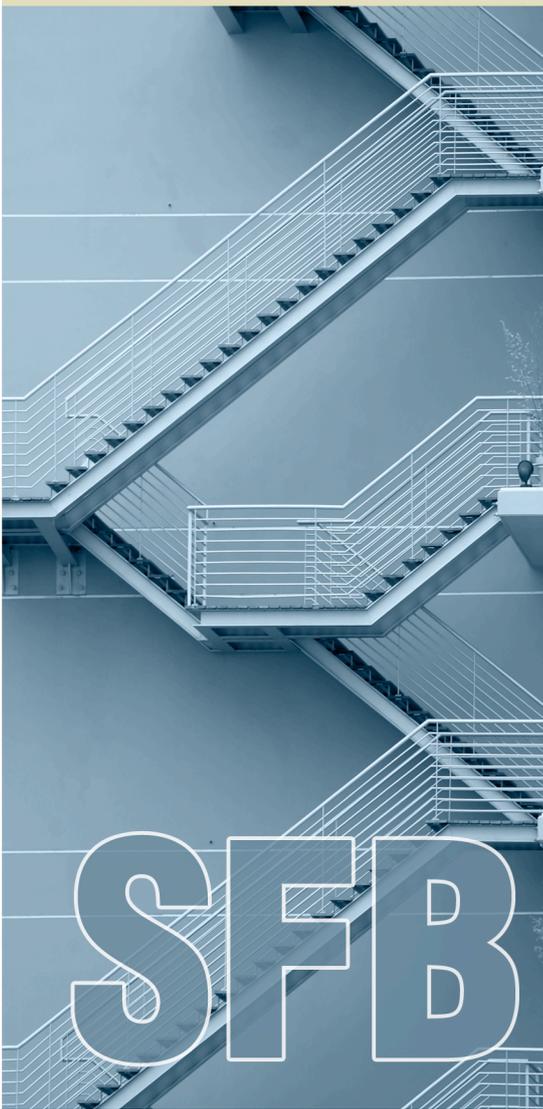
Morphological, Syntactic and Semantic Aspects of Dispositions

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Volume Editors: Fabienne Martin
Universität Stuttgart
Institut für Linguistik/Romanistik
Keplerstrasse 17
D-70174 Stuttgart
fabienne.martin@ling.uni-stuttgart.de

Marcel Pitteroff
Universität Stuttgart
Institut für Linguistik/Anglistik
Keplerstrasse 17
D-70174 Stuttgart
marcel@ifla.uni-stuttgart.de

Tillmann Pross
Universität Stuttgart
Institut für maschinelle Sprachverarbeitung
Pfaffenwaldring 5b
D-70569 Stuttgart
prosstn@ims.uni-stuttgart.de

Series Editor: Jonas Kuhn
Universität Stuttgart
Institut für maschinelle Sprachverarbeitung
Pfaffenwaldring 5b
D-70569 Stuttgart

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The SFB 732 brings together scientists from the areas of linguistics, computational linguistics and signal processing at the University of Stuttgart. Their common scientific goals are to achieve a better understanding of the mechanisms that lead to ambiguity control/disambiguation as well as the enrichment of missing/incomplete information and to develop methods that are able to fully describe these mechanisms.

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Contact Information:

Director of the SFB 732:

Prof. Dr. Jonas Kuhn
jonas@ims.uni-stuttgart.de

Coordinator of the SFB 732:

Dr. Sabine Mohr
sabine@ifla.uni-stuttgart.de

SFB 732
Universität Stuttgart
Keplerstr. 17
D-70174 Stuttgart

Phone: 0711/685-83115

Fax: 0711/685-83120

Preface

This volume gathers a subset of the papers presented at the Workshop on the Morphological, Syntactic and Semantic Aspects of Dispositions held at the University of Stuttgart from June 25 to June 27 2015. The invited speakers were Artemis Alexiadou, Nora Boneh, Elena Castroviejo, Ariel Cohen, Bridget Copley, Hans Kamp, Marika Lekakou, John Maier, Christopher Piñón, Károly Varasdi and Barbara Vetter. Other contributions have been presented by Simona Aimar, Saveria Colonna, Marta Donazzan, Berit Gehrke, Daniel Kodaj, Nick Kroll, Isabelle Roy and Lucia Tovená.

While appeals to dispositions have been made in just about every area of linguistics and philosophy, the syntax, semantics and ontology of dispositions is still subject to debate. A first obvious reason why dispositions are hard to deal with in linguistics is that the predominant Neo-Davidsonian account of logical forms is based on the isolated analysis of actual relations between causes and effects, whereas dispositions pertain to potential cause-effect relations, difficult to grasp in traditional syntax/semantic frameworks. Besides, whereas for actual causations, the binary distinction between the roles Agent/Causer and Theme/Patient makes perfect sense, possible cause-effect relations partly escape these distinctions. The instantiation of a disposition in an object is not related to being an Agent or to being a Theme of the disposition. A second obvious difficulty raised by dispositions is due to the versatility of dispositional predicates. Those are commonly used to describe either permanent or temporary properties of individuals, or manifestations of these properties through events, not to mention their other (e.g. epistemic) readings.

The goal of the workshop was to subject to critical scrutiny the Neo-Davidsonian foundation of syntax and semantics in the light of the linguistic expression of dispositional causal powers. We aimed to bring together linguists and philosophers interested in contributing to a common point of departure in the analysis of dispositions beyond the Neo-Davidsonian framework.

Three central questions emerged as central issues of the workshop:

1. Uncontroversially, dispositions are properties - but what kind of properties are dispositions?
2. What are dispositions properties of?
3. Do the different expressions we find in natural languages differentiate between different types of dispositions?

The papers collected in this volume represent the variety of answers that have been provided by the workshop participants to one or more of these questions.

Concerning the first question, centered on the *nature* of dispositions, the paper by Vetter argues that dispositions are irreducible modal properties, and proposes a modal semantics which uses the resources of an ‘anti-Humean’ metaphysics instead of possible worlds. The papers by Boneh and Cohen approach in more detail the specificity of the modal properties that correspond to dispositions. Boneh examines the relation between dispositional and habitual readings. She argues that in bare generic sentences, there is no sound linguistic criteria to set apart dispositional readings from habitual readings. Cohen proposes a classification of dispositions according to whether their argument is a causer or not, and whether they are always, or only sometimes realized. He demonstrates that each such type of disposition is expressed by a distinct linguistic expression.

The *bearer* of dispositions is the subject of the papers of Kroll, Donazzan & Tovenà and Cohen. Kroll analyzes events in progress as being the bearers of dispositions. Donazzan and Tovenà, like Cohen, highlight the fact that bearers of dispositions are often systems consisting of one or more protagonists situated in an environment.

With respect to the *linguistic expression* of dispositions, Castroviejo & Oltra-Massuet present a case study on the semantics of the Spanish expression *ser capaz* ‘be capable’, which is carefully compared to its English counterpart.

The paper by Alexiadou examines the restrictions on the formation of –able adjectives from object experiencer verbs. She argues that their availability depends not only on their aspectual properties, but also on the Voice system of a language – i.e. dispositional –able formation takes as input a structure involving passive resp. middle Voice. Finally, Roy et. al. consider how grammatical and conceptual knowledge affect children’s and adults’ interpretation of derived –er nominals such as *cutter of branches* (a phrasal –er nominal) and *branch cutter* (a compound –er nominal) in English.

We very much thank all presenters of the workshop for their stimulating and inspiring contributions, and are very happy to present some of them in this exciting volume. We also gratefully acknowledge financial support from the Collaborative Research Center SFB 732 “Incremental specification in Context” financed by the *Deutsche Forschung Gemeinschaft*, the Lab *Structures Formelles du Langage* at CNRS/Université Paris 8 and the Department of Philosophy at the Humboldt University Berlin. Our thanks also go to all colleagues that accepted to review the submissions to our workshop and provided authors with substantial feedback. Finally, we would like to thank to Christopher Piñón for providing us with the template we used to ensure a uniform style of the proceedings and for support during the editing process.

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-Able Adjectives and the Syntax of Psych Verbs

Artemis Alexiadou

This paper deals with some restrictions on the formation of *-able* adjectives from object experiencer verbs. It is shown that these can be accounted for under the assumption *-able* dispositional formation takes as an input a structure including passive Voice.

Keywords: psych-verbs, dispositional adjectives, evaluative adjectives, agentivity, passive

1 Introduction

Psych verbs have been a constant puzzle to researchers for a variety of reasons. A first concern relates to the fact that they can project the experiencer theta-role as an object or as a subject, thus creating a problem for thematic hierarchy and linking (see e.g. Belletti & Rizzi 1988, Grimshaw 1990, Pesetsky 1995, Arad 1998, Anagnostopoulou 1999, Pykkänen 2000, Reinhart 2001, Verhoeven 2008, Landau 2010, among many others). A second concern relates to their aspectual behavior. In particular, they are ambiguous between eventive and stative readings, and there is no agreement as to the exact categorization of the eventive interpretation these may receive (activity, achievement or accomplishment; see e.g. Grimshaw 1990, van Voorst 1992, Tenny 1994, Martin 2006, Rozwadowska 2007, 2012, Landau 2010, Marín & McNally 2011 and others).

In this paper, I will not be concerned with the first issue, but try to contribute to the second one by looking at the behavior of psych verbs and *-able* affixation, a rather understudied area, which, however, seems to provide insights into the structure of psych verbs and more importantly the organization of Voice systems across languages. Let me briefly illustrate why.

Previous literature has established that there are two types of *-able* adjectives in English and across languages, see for example Aronoff (1976) and much subsequent work, and more recently Ultra-Massuet (2013). Irrespectively of the perspective adopted, lexicalist vs. syntactic, researchers all agree that the two types differ in that type 1 *-able* adjectives are idiosyncratic, while type 2 ones are transparently derived adjectives from a verbal source.

Ultra-Massuet (2013: 42) in particular offers an analysis of these patterns adopting the framework of Distributed Morphology and argues that there are two places for *-able* derivations that give rise to distinct semantics (which she labels potential vs. evaluative). High vs. low *-able* differ in that high *-able* involves adjective formation out of a verbal predicate, specifically a passive, while low *-able* involves adjective formation out of a root. This high vs. low attachment of the morpheme correlates with a number of other properties summarized in table 1 (see Ultra-Massuet's work for a complete list):

I am grateful to the participants of the workshop on the morphological, syntactic and semantic aspects of dispositions organized at Stuttgart University in June 2015 for their input. Many thanks to Jeannique Darby, Nils Hirsch, Despina Oikonomou, and especially Gianina Iordăchioaia for comments and input. This research was supported by a DFG grant to the project B6 of the SFB 732 in Stuttgart.

Table 1**High -able**

always expresses possibility
 meaning is compositional
 does not trigger stem allomorphy
 allows derived bases
 stress does not shift
 always spelled out as *-able*

Low -able

may express no modality
 may have idiosyncratic meaning
 may trigger stem allomorphy
 only underived bases
 stress shifts
 maybe spelled out as *-ible*

Evidence from morphology, discussed in Aronoff (1976), points to different modes of derivation. As can be seen in (1), root-derived, or truncated *-able* in Aronoff's terms, has unpredictable semantics, while un-truncated *-able* has transparent semantics and is related to a verbal form.

Truncation:

- (1) a. tolerable = moderately good
 b. toleratable = capable of being tolerated
 c. appreciable = substantial
 d. appreciatable = capable of being appreciated (Aronoff 1976)

Thus in principle we could adopt the following two structures for the two types. (2) corresponds to low *-able*, and (3) to high *-able*. I will revise (3) later on the basis of Oltra-Massuet's findings.

- (2)
- $$\begin{array}{c} a \\ \diagdown \quad \diagup \\ \sqrt{\text{toler}} \quad \text{able} \end{array}$$
- (3)
- $$\begin{array}{c} a \\ \diagdown \quad \diagup \\ v \quad \text{able} \\ \diagdown \quad \diagup \\ \sqrt{\text{toler}} \quad \text{ate} \end{array}$$

The above structures follow the general tenants of Distributed Morphology, according to which there are two places to build words: words can be built out of roots as in (2), or out of words, as in (3), see Alexiadou (2001), Arad (2005), Marantz (2000), and Embick (2010) for discussion. Word formation out of roots is characterized by low productivity, unpredictability in form and meaning, while word formation out of words is regular and shows predictability in both form and meaning. These properties apply to the two *-able* formations as well.

Consider for example (4), where we have two *-able* adjectives related to the verb *defend*. Crucially, only in the former one do we have root allomorphy. By contrast, the latter, *defendable*, is transparently related to the meaning of the verb *defend*. As stated in Marantz (2000), this is expected if we are dealing with words derived from roots and words derived out of words.

- (4) defend-defensible-defendable (Aronoff 1976)

The semantics of the two types also differ and this correlates with their morpho-syntactic make up. High *-able* adjectives create a generic property, according to which it is possible for some originator to achieve a resultant state. The event interpretation implies an external

argument e.g. *translatable*. Oltra-Massuet calls this reading *potential*. Low *-able* adjectives, by contrast, have idiosyncratic properties, and express a modality that differs from regular possibility, e.g. *admirable*. Oltra-Massuet calls this second interpretation *evaluative*.

- (5) a. translatable = can be translated
b. admirable = no direct reference to a verbal component

As Oltra-Massuet points out, languages such as German have a different affix to express the evaluative judgment:

- (6) wünschenswert 'desirable' *wünschbar

High *-able* adjectives have thus a more complex structure. They involve a resultative component and an agentive component. Oltra-Massuet discusses several tests that can be used to diagnose the presence of an external argument in high *-able* adjectives. These include:

1. Control into purpose clauses
2. Licensing of *by*-phrases (non-specific)
3. Licensing of agent-oriented modifiers
4. Licensing of instrumental phrases
5. Licensing of aspectual/manner adverbs

Applying these tests to English and German, we see, as stated in Oltra-Massuet (2013), that the form that is associated with high *-able* licenses *by*-phrases, but the low one does not:

- (7) a. *The view is defensible by anyone.
b. The view is defensible by anyone.
- (8) a. ein vom Benutzer/*von Maria leicht modifizierbares Programm
a by.the user/ by Mary easily modifiable program
b. Der Angriff ist *von Maria/der Regierung beklagenswert.
the attack is by Maria/ by.the government regrettable

Oltra-Massuet observed some restrictions on *by*-phrases. To the extent that *by*-phrases occur, they must be non-specific and generic. These restrictions are interesting as they are similar to those found in adjectival passives and verbal passives in some languages, as well as dispositional middles (see e.g. McIntyre 2013, Gehrke 2015, among others; Lekakou 2005, Alexiadou, Anagnostopoulou & Schäfer 2015 for a summary of the literature and references) - a point I will turn to.

But why is this discussion relevant for psych-verbs? Apparently, when it comes to *-able* formations out of object experiencer predicates, some are good, and some are not, see (9) (see also Trips & Stein 2008):

- (9) annoyable *depressable

This holds in other languages as well, e.g. Italian:

- (10) *atterribile irritabile Bisetto (2013)
terrify-able irritable

More interestingly, in languages such as German and Greek, it is not even possible to form an adjective bearing the potential reading from this class of predicates. In Greek, this is

particularly clear with the affix *-sim-*, which can have a reading similar to high *-able*, as I will show further below:

- (11) **enohlisimos*
annoyable

German, as we have just seen, has distinct realizations of high (*-bar*) and low (*-wert*) *-able*. Still, object experiencer predicates cannot combine with either affix, see e.g. *verwundern* ‘amaze’:

- (12) a. **verwunderbar*
b. **verwundernswert*

The above raises the following questions: what can the behavior of the potential affix across languages tell us about the properties of psych verbs? What other properties does it correlate with?

Moreira (2014) and Oltra-Massuet (2013) describe the conditions on high *-able* as follows. According to Moreira, high *-able* combines with eventive predicates, and cannot combine with stative predicates. Oltra-Massuet claims that high *-able* combines with verbs that involve some originator who achieves a resultant state. There is no implication that the event has taken place. I will call this the Moreira/Oltra-Massuet generalization: high *-able* combines with eventive predicates that involve an originator that contributes to the achievement of a resultant state. In other words, high *-able* formation seems to prefer accomplishment predicates. If this is the correct description/generalization, then we can reformulate the research question: object experiencer predicates have been argued to have the relevant event structure properties, but still they seem to be marginal with *-able*. Why is that so?

The paper is structured as follows: I will first discuss the main classes of psych verbs that have been acknowledged in the literature. In section 3 I will turn to *-able* adjectives and psych verbs across languages. Section 4 offers an analysis, and section 5 concludes my discussion.

2 Types of psych verbs

According to Belletti & Rizzi (1988), Pesetsky (1995), Landau (2010) and many others, there are three classes of psych verbs. The first class is that of subject experiencer verbs, where the experiencer appears as the subject of the predicate:

- (13) John fears storms.

The second class is that of accusative object experiencer verbs, where the experiencer appears as the accusative object of the predicate:

- (14) The message worries John.

The third class involves an object experiencer that surfaces with dative case:

- (15) The song appeals to John.

While there is some consensus as to the status of class I and class III verbs, Class II has been controversially discussed in the literature, and the reader is referred to Landau (2010) for an overview. What is important for my discussion is here is Arad's (1998) classification. Arad shows that there are three different interpretations associated with class II verbs, see (16): an agentive reading where there is both an agent and a change of state in the experiencer; an eventive reading implying that something unintentionally caused a change of mental state in the experiencer; a stative reading where there is no agent nor any change of mental state.

- (16) a. Anna frightened Laura deliberately. *agentive*
 b. Nina frightened Laura unintentionally. *eventive, non-agentive*
 c. The noise frightened Laura. *eventive, non-agentive*
 b. Anna's behavior frightens Laura. *stative*

Landau (2010) argues that agentive class II verbs are change of state verbs (i.e. accomplishments) and not actually psych verbs. But now, if *-able* can attach both high and low, the behavior of psych verbs is unexpected both within a language and across languages. One would in principle expect that stative verbs should tolerate low *-able*, while eventive psych verbs should be fine with high *-able*. But as we have seen for some languages, there is simply no *-able* derivation with accusative object experiencer predicates.

Let us consider this behavior in some detail in the next section.

3 *-Able* adjectives and psych verbs

3.1 *In English*¹

Formation of *-able* adjectives with Class I predicates, which researchers agree are stative, is generally possible, see (17):

- (17) admirable, hateable, enjoyable, likeable

There is agreement in the literature that these formations involve low *-able*, i.e. *admirable* does not mean 'can be admired', and there is no direct reference to an event component. As these verbs are stative, it is expected that the *-able* formations derived from them will only involve low *-able*, see the Moreira/Oltra-Massuet generalization on high *-able* above.

Formation of *-able* adjectives with accusative object experiencer verbs shows a non-uniform behavior. For instance, Iwata (1995) considers (18) grammatical:

- (18) a. I can't help annoying John. He is so annoying.
 b. *This movie is annoying.

Iwata took (18) to suggest that psych verbs do have a direct internal argument, contra the unaccusative analysis proposed in e.g. Belletti & Rizzi (1988). However, not all accusative object experiencer verbs can form *-able* adjectives:

- (19) *disgustable, *puzzleable, *charmable

The question then is which *-able* is involved in the formations that are possible. I believe there is evidence that, at least in some cases, low *-able* is involved. First of all, some of the forms that occur in these *-able* adjectives must be truncated:

- (20) irritate irritable *irritatable

Second, *-able* affixation sometimes leads to stress shifts:

- (21) terrify terrifiable

Thirdly, they do not seem to tolerate *by*-phrases:

- (22) *John is irritable by anyone.

¹ Note that it is often said that *-able* prefers Latinate bases. Trips & Stein (2008), however, show that the affix was integrated into the English word formation system and could be applied to native bases from very early on.

Thus, on the basis of Oltra-Massuet's criteria, at least for these psych verbs that can form *-able* adjectives, low *-able* seems to be involved. (We will slightly revise this later on).

3.2 Beyond English

If we now look at other languages, the picture becomes slightly more complicated. For instance, Italian seems to be similar to English: some object experiencer verbs can form *-able* adjectives, some cannot, see Bisetto (2013):

- (23) a. *divertibile b. *estasiabile c. *disgustabile
 amuseable delightful disgustable
- d. irritabile e. impensieribile f. incoraggiabile
 irritable worryable encourageable

Bisetto (2013) argues that this is so, as *-bile* does not attach to achievements. This seems consistent with the Moreira/Oltra-Massuet generalization, as achievements are punctual.

In German, with the exception of *verletzen* 'hurt' and maybe *verärgern* 'enrage', other accusative object experiencer verbs do not form either *-bar* or *-wert* adjectives (Thanks to Nils Hirsch for providing me with the data).

- (24) *verblüffbar *verblüffenswert *zermürbbar *zermürbenswert
 amaze-able amaze-wert demoralize-able demoralize-wert

Class I predicates seem fine, with *-wert* but not with *-bar*, as expected:

- (25) liebenswert bewundernswert mögenswert
 love-able admire-able like-able
- (26) *lieben-bar *bewunderbar *mögenbar

The behavior of Class I psych verbs is predicted on the basis of the Moreira/Oltra-Massuet generalization.² What is not predicted is the behavior of class II predicates.

In Greek, there are two ways to form dispositional adjectives. The first one is discussed extensively in Samioti (2015) and it involves the affix *-tos*, which forms potential adjectival participles, sometimes in combination with certain prefixes, e.g. *axio* 'worthy'. Samioti argues in detail that ability/possibility *-tos* participles involve high *-tos*, as they can license *by*-phrases and manner adverbials:

- (27) a. I istoria tu ine pistefti apo olus.
 the story his is believable by all
 'His story is believable by all.'
- b. To mathima ine efkola katanoito.
 the lesson is easily understandable
 'The lesson is easily understandable.'

The second one involves the affix *-sim-*:

² Note also that in Spanish, most adjectives that show the evaluative/low *-able* reading are subject experiencer predicates (Class I).

- (28) a. metafrasimo b. katikisimo c. fagosimo
 translatable inhabitable eatable

Note that (28c) does not necessarily denote that something can be eaten. In Greek, this form, especially in the plural, is used to refer to food in general. (28a) has an interpretation similar to the one associated with high *-able*, as we will see immediately below.

A closer look at the properties of *-sim-* in (28a) provides evidence for high affixation. First of all, it licenses manner adverbs:

- (29) To vilvio ine efkola metafrasimo.
 the book is easily translatable

It also licenses *by*-phrases as well as aspectual phrases:

- (30) To vivlio ine metafrasimo apo ebirus metafrastes.
 the book is translatable by experienced translators

- (31) To vivlio ine metafrasimo mesa se deka meres.
 the book is translatable within 10 days

We can thus conclude that *-sim-* patterns with high *-able*. Turning now to psych verbs and dispositional adjectives derived from such predicates, note that Class I predicates can combine with *-tos* but not with *-sim-*:

- (32) agapitos zileftos misitos thavmastos
 lovable jealous-able hate-able admire-able

- (33) axiolatreftos axiozileftos axiosevastos
 worthy-admired worthy-jealous worthy-respect

Class II predicates cannot combine with *-sim-*:

- (34) *enohlisimos *thimosimos *sinhisimos
 annoyable angerable confuse-able

With very few exceptions, they do not combine with *-tos* either, and only in combination with a prefix/adverb meaning ‘easily’ (as Despina Oikonomou pointed out to me):

- (35) everethistos ev-prosvlitos efkolo-siginitos
 easily-irritable easily-assailable easily-moveable

With respect to (35), Samioti notes that this seems to involve an anticausative formation, not a passive, as *by*-phrases are disallowed, but the *by itself* phrase is allowed; this test diagnoses the absence of an external argument, as discussed at length in Alexiadou, Anagnostopoulou & Schäfer (2015):

- (36) O Janis ine everethistos apo monos tu/*apo olus.
 John is easily.irritable by himself/ *by all

That *-tos* in these examples has a potential reading is argued for in Samioti (2015: 76). As she points out, similar to *-able*, the adjective does not imply that the event described has taken place.

- (37) To asteri ine orato apo ti gi, ala de to ehi di kanis akomi.
 ‘The star is visible from the earth, but noone has seen it yet.’

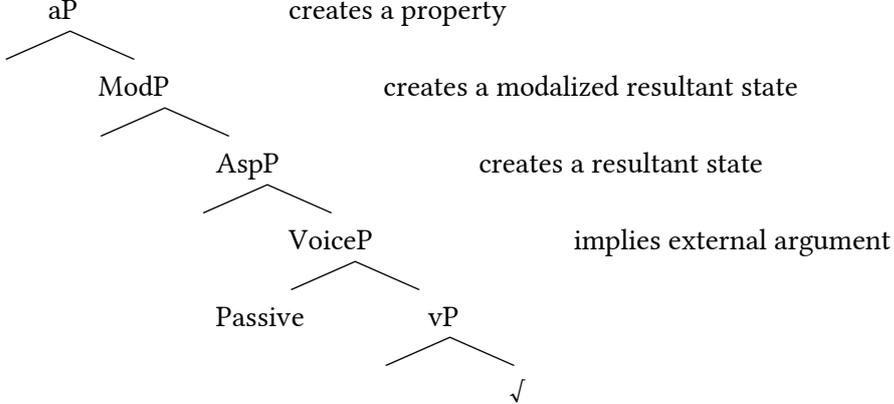
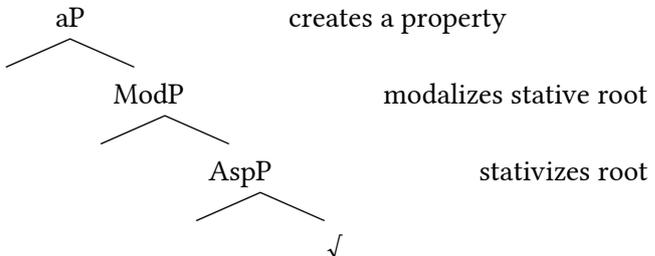
We can make a similar observation for *-sim*:

- (38) To vivlio ine metafrasi mo ala den to ehi metafrasi kanis akoma.
 the book is translatable but NEG it has translated anyone yet
 ‘The book is translatable but nobody has translated it yet.’

Thus the question that arises is: why is it not possible for a class II psych verb in Greek (or German) to form a dispositional adjective?

4 Towards an analysis

Let us now consider the syntax of high and low *-able* in some details, following Oltra-Massuet (2013). While both formations are adjectival, a crucial difference between the two is that high *-able* includes the layer that introduces the external argument. A further difference is that high *-able* contains an event layer, while low *-able* simply involves root affixation. According to Oltra-Massuet (2013: 153), in the case of low *-able*, first the root merges with AspP, which is a stativizer. ModP modalizes the formation, and when it merges with a stative root, the readings that are obtained may be non-potential. By contrast, in the case of high *-able*, the pieces involved in the formation yield a reading according to which it is possible for some arbitrary individual to perform the action denoted by the eventive predicate:

- (39) a. 
 A syntax tree for high *-able* formation. The root node is aP, which branches into ModP and a property. ModP branches into AspP and a modalized resultant state. AspP branches into VoiceP and a resultant state. VoiceP branches into Passive and vP. vP branches into a root (marked with a checkmark) and another node (marked with a checkmark).
- b. 
 A syntax tree for low *-able* formation. The root node is aP, which branches into ModP and a property. ModP branches into a modalized stative root. ModP branches into AspP and a stativized root. AspP branches into a root (marked with a checkmark) and another node (marked with a checkmark).

Looking at the behavior of psych verbs from this perspective, we are close to offering an analysis of their restrictions. In all languages under discussion, subject experiencer predicates combine with low *-able*. These verbs do not denote events, and do not include an external argument that acts volitionally. Thus, these show the expected behavior.

Object experiencer predicates, by contrast, show a non-uniform behavior within a language and across languages. The reason for this is that such predicates do not all fit in one aspectual class, within a language and across languages. If the test discussed here is sensitive to aspectual properties, we expect to find a lot of variation. To this end, it is now crucial to consider different aspectual types of object experiencer predicates in English and in Greek in some detail. As Alexiadou & Iordăchioaia (2014) pointed out, building on e.g. Grafmiller (2013) and references therein, there is a group of these verbs that is stative only: e.g. *fascinate*. This group of verbs does not really give good *-able* formations, although in principle root affixation should be possible. As Gianina Iordăchioaia (p.c.) observes, a difference between the two types of stative verbs is that only in the case of stative object experiencer predicates would *-able* formation attribute a property/an evaluative judgment to the experiencer argument, i.e. the argument that experiences the mental state. In the case of class I verbs, which, in this respect, behave like other stative verbs, *-able* formation attributes an evaluative judgment to the argument of the state.

In Spanish, according to Val Álvaro (1981), cited in Oltra-Massuet (2013: 106), subject experiencer predicates give rise to appreciative readings in *-able* formation, which can be attributed to the argument of the state. By contrast, object experiencer predicate formations receive a second reading paraphrasable as ‘X is easy to V’, for instance *excitable* ‘excitable’ or *irritable* ‘irritable’ are interpreted as X is easy to excite or irritate. Thus one would expect that predicates that do not give rise to such an interpretation should be banned from low *-able* formation. Indeed, *John is easy to fascinate* is bad as opposed to *John is easy to irritate*, which is much better. If this is the correct semantic specification of these formations, then we can formulate the generalization that low *-able* is possible, whenever this second reading is also possible. I believe Iwata’s data, discussed above, relate to this reading. Importantly, this is not a reading involving an implicit external argument.

There is a second group of accusative object experiencer predicates which could be classified as states or activities. Evidence for this comes from the incompatibility of several of these verbs with *in*-adverbials, indicating that they lack a change of state reading. The question that arises is whether they permit low *-able* affixation. Interestingly, they seem not to. If we employ the *easy to V* paraphrase, we see that these verbs cannot be included in these paraphrases: ??*Sue is easy to puzzle*, ??*Bill is easy to delight*:

- (40) a. Sue *grieved* over the court decision *for/*in half an hour*.
 b. Sue *grieved* at the court decision *for/*in half an hour*.
 c. The court decision *grieved* Sue *for/*in half an hour*.
- (41) a. We *puzzled* over Sue’s remarks *for/*in an hour*.
 b. Sue’s remarks *puzzled* us *for/*in an hour*.
 c. Bill *delighted* in his new-found wealth *for/??in two months*.
 d. His new-found wealth *delighted* Bill *for/??in two months*.

If this is the case, they should disallow high *-able* affixation which requires a resultant state brought about by an originator – and indeed such formations are out. Moreover, low formations cannot acquire the second easy to V reading, e.g. **Sue is easy to grieve*, thus low *-able* is also out:

- (42) *grievable *puzzleable *delightable

Finally, there is a class of predicates that are ambiguous between a change of state and a state reading. Alexiadou & Iordăchioaia show that this is supported by *for*-adverbials, which may

modify the result state (RS) of the COS reading documented in (43), or the single eventuality (SEv) like with pure states.

- (43) The Chinese dinner satisfied Bill *for ten minutes*.
 i. RS: After having the Chinese dinner, Bill was satisfied for ten minutes.
 ii. SEv: Having the Chinese dinner kept Bill satisfied. Both the dinner and his satisfaction lasted for ten minutes simultaneously.

We predict that the verbs that have a RS interpretation should be able to form high *-able* adjectives. Indeed this is the case.

- (44) John is easily satisfiable.

Now what about Greek? Recall that Class II predicates cannot combine with neither *-sim-* nor *-tos*:

- | | | | | |
|------|--------------|-------------|--------------|-----------|
| (45) | *enohlisimos | *thimosimos | *sinhisimos | *thimotos |
| | annoyable | angerable | confuse-able | angerable |

But most Greek class II predicates have a RS, see (46-47) from Alexiadou & Iordăchioaia (2014). As these authors argued in detail in Greek several psych verbs undergo the causative alternation, i.e. they are change of state verbs. Evidence for this is provided by the availability of a restitutive reading for the Greek counterpart of again, *ksana*, which detects the presence of a resultant state in the structure:

- (46) Ta nea enohlisan to Jani *ksana*
 the news annoyed the John again
 ‘The news annoyed John again.’
- (47) a. *Repetitive scenario*
 O Janis ine poli iremos anthropos, ala ta nea panda kapos katafernun ke ton enohlun. Htes, os sinithos itan iremos, ala ... (46)
 ‘John is a very calm person, but the news somehow always manage to annoy him. Yesterday, as usual, he was calm, but ... (46)’
- b. *Restitutive scenario*
 O Janis ine panda thimomenos. Htes, itan, kat’ekseresi iremos, ja ligo, ala kapia stigmi... (46)
 John is always angry/annoyed. Yesterday, he was exceptionally calm for a while, but at some point ... (46)

Thus it seems to be that all ingredients are in place. However, the verbs do not form *-able* adjectives. I believe that this relates to the peculiarities of the Greek Voice system, and I will now show how this is connected.

To begin with, in Greek psych verbs are not the only ones that cannot combine with *-sim-*. In fact many change of state verbs cannot combine with it. Zombolou (2004: 130) notes the following:³

³ Zombolou further notes that the same class of predicates does not form *-er* nominals in Greek:

(i) shizo ‘tear’ *shistis ‘tearer’

Alexiadou, Anagnostopoulou & Schäfer (2015) suggest that only verbs based on manner roots form *-er* nominals. This raises the question of whether the restriction is similar for *-sim-*.

that results from the combination of a particular stem with the non-active affix (e.g.: **vathinome* ‘deepen-NAct’, **kontenome* ‘shorten-NAct’, **leptenome* ‘thin-NAct’, **makrenome* ‘lengthen-NAct’).

Zombolou (2004) points out that passivizability is also restricted outside the domain of change-of-state verbs. For instance, the following (mono-eventive) verbs cannot easily form a passive in Greek (or not at all, for some speakers), while they can in English and German: *haidevo* ‘stroke’, *derno* ‘beat’, *klotsao* ‘kick’, *frondizo* ‘take care of’. These verbs do not combine with *-sim-*.

Third, there are several verbs, which, while they can combine with non-active morphology, they cannot receive a passive interpretation e.g. *burn*, *cut* and *kill*. As shown in (52), agentive *apo*-phrases are not tolerated with such verbs, i.e. they only form anticausatives.

- (52) I supa kaike me ti dinati fotia/ *apo to Jani.
 the soup.NOM burnt.NAct with the strong fire/ from the John
 ‘The soup burned from the strong fire.’

Crucially, none of these verbs combines with *-sim-*.

Now, several of our psych verbs cannot combine with non-active morphology:

- (53) a. o Janis thimose ti Maria.
 John angered Mary.
 b. *i Maria thimothike (apo to Jani).
 Mary was.angered by John
- (54) *ponethike ‘feel pain-NAct-3sg’
 *tromahtike ‘terrify-NAct-3sg’
 *aidiastike ‘disgust-NAct-3sg’

Other object experiencer verbs can have subject experiencer predicates with NActive morphology, but either prefer Causer PPs suggesting that maybe a passive (agentive) interpretation is not available (55a), or are purely stative (55b). See also Oikonomou (2011), who points out that even agentive OE predicates do not passivize in Greek:

- (55) a. disarestithike me to Tsipra.
 was.displeased-NAct with Tsipras
 ‘He was displeased with Tsipras.’
 b. endiaferthike ja ta fita.
 was.interested-NAct in plants
 ‘He was interested in plants.’

Several class I psych verbs are deponent predicates, i.e. transitive verbs with NAct morphology, which cannot passivize:

- (56) fovame ‘fear-NAct’
 lipame ‘feel sorry-NAct’

I thus conclude that the restrictions on *-sim-* formation in Greek relate to the restrictions on Middle Voice. Predicates that cannot combine with Middle Voice cannot form *-sim* adjectives.

The above suggests that these predicates never form agentive passives. In fact, there is further evidence for the absence of an agent external argument in these formations. This is provided by interaction with modals. Giannakidou & Staraki (2013) show that there is a lexical

split in Greek between the impersonal *bori* – an epistemic possibility modal form, something like *might* in English – and personal *boro* which is never epistemic, but abilitative or deontic.

- (57) a. Ta pedia bori na ine sto spiti.
 the children might.3sg.INP SUBJ be.3pl.INP to-the home
 Epistemic: ‘As far as I know, it is possible that children are at home.’
 b. Ta pedia borun na pane sto spiti mona tus.
 the children can.3pl.INP SUBJ go.3pl.INP to-the home alone them
 Ability: ‘Children are able to go home on their own.’
 Deontic: ‘The children are allowed to go home by themselves.’

Note that those psych verbs that can build NAct cannot appear in the latter context, i.e. they can only combine with epistemic modality. This is in sharp contrast with the predicates that can form *-sim-* adjectives:

- (58) Ta pedia bori/*borun na enohlithun.
 the children might/can.3pl SUBJ annoyed-3pl
 (59) Ta vivlia borun na metafrastun.
 the books can.3pl SUBJ translated-3pl

This is reminiscent of the contrast discussed in Hackl (1998). Hackl notes that verbal passives are fine under an ability modal, while stative or adjectival passives are not. Thus, one gets only the epistemic reading for *can* with an adjectival passive, and semi-modals are ungrammatical with an adjectival passive. This is particularly clear in German that distinguishes between the two passives morphologically, see (60-61), Hackl’s (38-39):⁴

- (60) a. John can be arrested.
 b. ?John is able to be arrested.
 (61) a. Der Hans kann eingesperrt werden.
 b. Der Hans kann eingesperrt sein. *epistemic only*
 ‘John can be arrested.’

Hackl relates that to the fact that verbal passives have an external argument (an agent), while adjectival passives lack such an argument.

The above would thus suggest that in Greek psych verbs cannot form agentive passives, as also observed by Oikonomou (2011), and are unable to enter any formation that would involve the presence of a Middle Voice head of the type described above, i.e. a head that is involved in the formation of agentive passives. Intransitive variants of these verbs are thus only anticausative and never passive.

If this is the correct analysis of the Greek pattern, the question that arises is what the explanation for German is, and what other properties the behavior we have seen correlates with. It is clear that the details of the Greek Voice system do not apply to German, e.g. passivization of change of state verbs is not restricted as is the case in Greek. However, it is not clear that class II psych verbs can form passives. For instance, *verletzen* ‘hurt’ and *verärgern* ‘anger’ can, and in this case high *-able* formation is possible, while *verwundern* ‘amaze’ cannot and high *-able* formation is out. In all cases, low *-able* formation is out, relating perhaps to the

⁴ Thanks to G. Iordăchioaia and D. Oikonomou for discussion on this point.

second type of reading that these predicates may or may not acquire, e.g. it is easy to V. I leave this for further research.

5 Conclusion

In this paper, I argued that the restrictions on *-able* formation relate to three factors, namely: i) high and low domains for word formation, ii) properties of event structure, and iii) properties of Voice systems across languages. High *-able* formation is only possible out of accomplishment predicates that give a well-formed agentive passive.

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On habituals and dispositionals

Nora Boneh

The paper sets out to challenge the claim that the distribution of FC-*any* in bare generic sentences giving rise to dispositional readings constitutes empirical evidence for the Possibility Hypothesis, assuming that dispositional sentences feature a covert existential modal quantifier equivalent to *can* or *might*. More generally, the paper attempts to suggest that dispositional and habitual readings, which arise in bare characterizing sentences, are not due to the same underlying covert modal operator. What enables suggesting such a view is the fact that bare characterizing sentences present different properties from those characterizing sentences that feature overt (temporal) quantification. It is shown that bare characterizing sentences pattern alike aspectually, irrespective of whether they give rise to a habitual or a dispositional reading. Following work by Boneh & Doron (2010, 2013), it is suggested that whereas quantified characterizing sentences feature the quasi-universal Gen, bare ones feature a VP-level operator Hab, built on the availability of sums of events in all relevant accessible worlds once a disposition for this type of event iteration is manifested in the actual world.

Keywords: habituals, dispositionals, genericity, bare characterizing sentences, Free Choice *any*, viewpoint aspect

1 Introduction

Characterizing or generic sentences give rise both to habitual and dispositional statements (see Krifka et al. 1995, p. 3), but it has been debated whether these distinct readings can be attributed to the same generic operator. For some scholars, habituals are a subtype of generics (Carlson 1977, Dahl 1985, Schubert & Pelletier 1989, Krifka et al. 1995, Greenberg 2002, Landman 2008), while for others the habitual is not modal but a particular type of grammatical aspect (Comrie 1976, Kleiber 1987, Verkuyl 1995, Bonomi 1997, Xrakovskij 1997, Lenci & Bertinetto 2000). As for dispositionals, some scholars take them to be a particular case of generics, see for instance Carlson (1989), Schubert & Pelletier (1989), while for others, dispositions have a distinct interpretation with existential force (Lawler 1973, Dahl 1975, Green 2000, Menendez-Benito 2005, 2013, Nickel 2010).

Concretely, it has been claimed that the following examples are ambiguous between a habitual and a dispositional interpretation.

- (1) John drinks beer.
 - i. John habitually drinks beer

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- ii. John is disposed to drink beer (if offered beer, he might very well drink it)
- (2) This car goes 120 mph.
- i. This car habitually goes 120 mph (it's a race car)
 - ii. This car is disposed to go 120 mph (it was built to reach this speed)

While there is little disagreement that habituals, similarly to many plain generics, involve universal or quasi-universal quantification over situations, the view that takes there to be an existential quantifier underlying the dispositional interpretation has been dubbed by Dahl (1975) the Possibility Hypothesis.

In this paper, following Boneh & Doron (2010, 2013), I will suggest that a semantic distinction should be made between bare characterizing sentences and characterizing sentences which are in the scope of an overt temporal quantifier. Boneh & Doron (2010, 2013) argue that once such a distinction is drawn, bare characterizing sentences should be analyzed as based on a disposition for event iteration in accessible worlds, and are thus not distinct from dispositionals, despite of the fact that dispositionals are usually identified on the basis of non-occurrence of events in the actual world (*pace* Carlson 1989, Schubert & Pelletier 1989). In characterizing sentences with overt quantification, habitual readings are interpreted as generic. While the LF of bare habituals features an operator *Hab*, that of quantificational habituals features *Gen*, a quasi-universal modal operator.¹

Specifically, I will show that arguments suggested in favor of the Possibility Hypothesis are not actually strong arguments. In particular, I will focus on the argument from Free Choice-*any* which is said to be sensitive to quantificational force. I will also point to the fact that dispositionals and habituals pattern alike in the way they interact with aspect, and that they are both distinct from quantificational characterizing generic sentences in this respect. This will be taken to indicate that compositionally, there is an underlying V or VP-level operator underlying both dispositionals and habituals.

The paper is structured as follows. Section 2 considers arguments in favor of the Possibility Hypothesis, focusing mainly on the issue of licensing of FC-*any*, suggesting that it cannot be a test for detecting the quantificational force of an implicit modal. In section 3, I review the proposal put forth in Boneh & Doron (2010, 2013) setting bare habituals and quantificational generics apart. Section 4 shows how two verbal forms in English - the simple past form and *would* - pattern differently in bare sentences and quantificational ones, respectively. Section 5 argues that bare sentences with dispositional and habitual readings pattern together in terms of event actualization in the actual world and their aspectual properties, contrary to generics. Section 6 concludes.

2 The Possibility Hypothesis and the argument from FC-*any*

Evidence for the Possibility Hypothesis seems to come from two main sources. First, paraphrases of the interpretations in (ii) of (1) and (2) can be respectively as follows:

- (3) John can/might drink beer.
- (4) This car can go 120 mph.

¹As a consequence of focusing the attention on bare generic sentences such as (1) and (2), Cohen's claim (this volume) that habituals are not modal and should therefore not be grouped together with dispositionals and generics is not applicable. Cohen claims that although habituals are intensional, they are not modal, since they are parametric on time, not worlds. As far as I understand, this cannot be demonstrated for bare habituals exemplified in (1) and (2), but might apply to habitual sentences containing overt quantification.

Second, the licensing of FC-*any* by modal auxiliaries may serve as an indication as to the quantificational force of the implicit modal underlying a dispositional sentence. Menéndez-Benito (2005), (2013) points to the following pattern, where FC-*any* is licensed under can (5a), but not under must (5b):

- (5) a. John can eat anything.
 b. *John must eat anything.
 c. John eats anything.

The implicit modal operator in (5c) seems analogous to can in (5a) and not to must (5b) in its ability to license FC-*any*, indicating that the implicit modal is existential. The dispositional operator differs from can/might in how the conversational background is determined (see discussion in Menéndez-Benito 2005, 2013).

Nickel (2010) uses the FC-*any* test to show that whereas (6b') is comparable to (6b), both presumably expressing the disposition of the car to go 120 mph, but not its habits, (6a') and (6a) are distinct: (6a) expresses a habitual reading and (6a') the disposition of the Eurostar. In other words, for Nickel, neither of (6a') or (6b') conveys a habitual reading, but rather the disposition of the Eurostar and of my Peugeot. In the case of (6a'), world knowledge makes it so that the sentence is slightly awkward, since it is known that the Eurostar goes at this high speed most of the time, but (6b') naturally expresses the capacities of my Peugeot.

- (6) a. The Eurostar goes 120 mph.
 b. My Peugeot goes 120 mph.
 a'. The Eurostar goes any speed up to 120 mph.
 b'. My Peugeot goes any speed up to 120 mph.

(Nickel 2010: ex. 9)

This reiterates the point made by Menéndez-Benito that FC-*any* is available only under the dispositional reading, not the habitual one.

The first argument in support for the Possibility Hypothesis, relying on paraphrase, is not a strong one, since paraphrase is no indication of LF. The second argument, involving the licensing of FC-*any*, will be shown not to be a sound diagnostic to detect existential quantification over universal one. In other words, I will try to show that the salience of a dispositional reading in a sentence containing *any*, as exemplified above, cannot be straightforwardly linked to the nature of the quantificational force of the covert modal.

Let us start by pointing out that not all speakers reject (5c) with a habitual interpretation, namely with an interpretation where there are regular eating events taking place in the actual world. Consider (7b) placed in the context set up in (7a):

- (7) a. How do you survive in this area, where food is so scarce?
 b. I (just) eat anything (I can find).

Note that (7b) is good under a habitual reading, without obligatorily adding a relative clause, namely without subtrigging.² This issue leads us to the next point.

Whereas the presence of FC-*any* in episodic sentences (8) and with an overt *must*-like modal (9) is usually impossible, subtrigging makes it possible (for discussion of the following examples see Menéndez-Benito 2005, Dayal 2009, Chierchia 2013, among others):

- (8) Bill read any book *(he found) / *(that was on his reading list).

² But see Dayal (2004) on the issue of covert subtrigging.

(Dayal 2009: ex. 2)

- (9) a. Bill may/*must read any book.
 b. Bill may read any book (he finds)/(on his reading list).
 c. Bill must read any book *(he finds)/ *(on his reading list).

(Dayal 2009: ex. 3)

Dayal (2009) claims that what is at stake in non-subtriggered episodic sentences and those containing the *must*-like modal is not directly the availability of an existential versus universal quantificational force, but the fluctuation requirement which *any* introduces. According to this requirement, no single set of individuals is such that it constitutes in every accessible world the set of individuals in the intersection of the nominal and the verbal properties in that world. In the case of possibility modals with existential quantification, this follows naturally, hence the felicity of FC-*any* in these environments. In plain episodic sentences, the exclusion of FC-*any* is trivial, since the set of individuals is only evaluated with respect to the actual world, the only relevant world. In the case of *must*-like modals, sets of individuals are identical across all the accessible worlds. Dayal (2009) suggests that subtriggering ameliorates the acceptance of *any* in the case of episodic sentences and *must*-like modals since it disables access to the full set of individuals involved, in such a way that the fluctuation requirement can then be maintained.

Let us reconsider Nickel's examples in (6), equipped now with Dayal's fluctuation requirement.³ In (6a'), the fluctuation requirement is not maintained if the Eurostar, in all accessible worlds, goes 120 mph; in this case, only a habitual reading is available. However, in the case of my Peugeot in (6b'), no clear distinction between a habitual and a dispositional reading can be made since under both readings, the fluctuation requirement may be respected. Under a dispositional reading, the actual world is not among the worlds in which my Peugeot goes (any speed up to) 120 mph, and under a habitual reading, my Peugeot may regularly go in varying high speeds in all accessible worlds, including the actual world. So the set of speeds need not be constant across accessible worlds, irrespective of the quantificational force. It becomes clear that what is at work are pragmatic conditions of interpretation and not directly the modal force of the implicit operator said to distinguish between a habitual and a dispositional reading. This is reminiscent of Carlson's (1981) view, whereby the presence of *any* forces a dispositional reading, but that otherwise, this type of sentence is vague with regard to the expression of dispositionality or habituality.

Support for the fact that there is no genuine ambiguity between a habitual and a dispositional reading in bare characterizing sentences comes from the following examples containing VP ellipsis.⁴ Consider first (10), which can be felicitously uttered in a context where a car dealer wants to convince a race driver to exchange her old car, which she really likes, for a brand new one:

- (10) Your car goes 100 mph without any problem, but so does this brand new one.

Here, the old car may be understood to go 100 mph habitually, due to the owner's profession, but with respect to the brand new car, the speed is intended dispositionally, as there are no actual driving events of this car yet. The felicity of this example, where ellipsis does not distinguish the habitual reading from the dispositional one, indicates that there is no true ambiguity.

³ See Chierchia (2013) for suggesting a wide scope analysis for *any* over the modal in these cases.

⁴ I thank Edit Doron for suggesting this test.

Here is an additional such example. A host would like to know what to prepare for his guests for dinner. He receives the following information:

(11) John eats bacon and so does Bill.

In this case, it is irrelevant whether one does so habitually and the other dispositionally, i.e. he does not object to eating bacon, and would eat bacon if presented with the right occasion, even if so far he has not eaten bacon on a regular basis.

The next section is concerned with teasing apart bare habituals from quantified habituals. This sets the basis for subsuming both dispositions and habituals under bare characterizing sentences.

3 Teasing apart bare habituals from characterizing generic sentences

According to the classical view (Krifka et al. 1995), habitual characterizing sentences express regularities which summarize a group of episodes or facts; in other words, a habitual sentence is related to an episodic sentence:

(12) a. Mary smokes when she comes home.
b. Gen (s;x) ; (x=Mary & x come home in s; x smokes in s)

Under this approach, there is no difference between characterizing sentences with overt quantification and those without. Thus, similarly to (12), a sentence such as in (13a), has the LF in (13b):

(13) a. Mary smokes.
b. Gen (s;x) ;(x=Mary & s is a normal situation with respect to smoking & s contains x ; x smokes in s)

But then if the habitual sentence is based on an underlying episodic sentence, it is not clear what in (14a) blocks the indefinite singular 'a cigarette' in a bare characterizing sentence, allowing only the bare plural NP 'cigarettes'; moreover, it is not clear why no such distinction arises when an overt restrictor, after dinner, is available in (14b).

(14) a. Mary smokes *a cigarette/cigarettes.
b. Mary smokes a cigarette/cigarettes after dinner.

One would expect the indefinite singular to allow a narrow scope interpretation in (14a), given the LF in (12b), but it does not. Assuming a covert restrictor as in (13b), one would also expect there to be no difference between a bare characterizing sentence and one with an overt restrictor such as in (14b).

In order to account for the infelicity of (14a) with an indefinite singular, Krifka et al. (1995: 40) need to assume that each simple situation is related to a different object. Others have proposed that some sort of monadic operator should be available in the case of bare habituals (cf. Carlson 1977, Dobrovie-Sorin 2001, Rimell 2004, Vogeleeer 2012, Cabredo-Hofherr 2013). Boneh & Doron (2013) follow this line of thought and suggest that in the case of bare generics, the plurality of events is the output of the operator Hab, which is distinct from Gen:

(15) a. # Mary smokes a cigarette.
b. $\exists x[\text{cigarette}(x) \ \& \ \text{Hab } e \ \text{smoke } (e, \text{Mary}, x)]$

The infelicity of (14a) then stems from the fact that one cannot smoke the same cigarette in multiple events. In a similar fashion, a singular indefinite object has an obligatory wide scope reading in habitual sentences, indicating that the operator involved in habituality does not scopally interact with the existential quantifier introduced by the singular indefinite.

- (16) a. John babysits a boy. $\exists > \text{'hab'}$
 b. *John usually babysits a boy. $\exists > \text{'hab'}$; $\text{'hab'} > \exists$

This fact has been noted by many (Carlson 1977, Lenci 1995, Zucchi & White 2001, Spector 2001, Scheiner 2002, van Geenhoven 2004, Rimell 2004, Ferreira 2005, Kratzer 2008).⁵

Furthermore, in characterizing sentences featuring a bare plural in subject position, Gen alone does not suffice to account for a habitual reading in the absence of overt quantification over events.

- (17) a. Women smoke.
 b. #Women smoke a cigarette.
 c. Women smoke a cigarette after dinner.

The examples in (17), with their LF in (18), indicate that a generic operator introduced to bind the variable of the bare plural, cannot at the same time bind the event variable in the absence of an overt restrictor on events. These examples illustrate that while a bare characterizing sentence as in (17a) might lead one to assume that it features a Gen operator as an unselective binder, (17b) shows that this is not the case, since here too, the indefinite singular may only be interpreted as having wide scope with respect to the covert operator. The singular indefinite in object position is only licensed if an overt restrictor is available, as in (17c). In this case, Gen unselectively binds the event variable restricted over by the quantificational expression, after dinner (18c).

- (18) a. Gen y [woman(y)] [Hab e smoke(e, y)]
 b. Gen y [woman(y)] $\exists x$ [cigarette(x) & Hab e smoke(e, y, x)]
 c. Gen y, e [woman(y) & after-dinner(e, y)] $\exists x$ [cigarette(x) & smoke(e, y, x)]

Assuming, as do Boneh & Doron (2010, 2013), that the bare characterizing sentences in (17a)-(17b) feature a covert operator Hab, (18a)-(18b) is a way to solve the puzzle of the unavailability of a singular indefinite in characterizing sentences, and its availability in quantified ones. Based on this reasoning, Boneh & Doron (2010, 2013) propose the following semantic definition for Hab.

- (19) $\text{Hab} \rightsquigarrow \lambda P \lambda s \lambda w \text{ [[INIT}(P, s, w) \ \& \ \forall w' \in \text{MB}_{\tau(s), w} \ \exists e [\tau(s) \subseteq \tau(e) \ \& \ \text{ITER}(P, e, w')]]]$

In words, (19) says that $\text{Hab}(P)$ is true of a state s in world w iff s is initiated in w , and for all worlds w' which are worlds close to the ideal world of the modal base $\text{MB}_{\tau(s), w}$ there is an event e , which temporally extends the state s , such that e is an iteration of P -events in w' . The modal base (Kratzer 1981, 1991) is a function from world-time pairs to a set of worlds, which are a set of gnomic alternatives to world w at time i , where dispositions are as in w at i . The alternatives are ordered by their closeness to the ideal world where dispositions hold constantly once initiated.

The definition of ITER is provided in (20). The notion at the basis of habituality is event iteration (e.g. Vlach 1993). It is defined on the basis of iteration in Kratzer (2008), where P is a

⁵ The authors mentioned differ as to whether they consider habituals or non-habitual event iteration. Among those that discuss habitual sentences, some do not take habituality to involve modality (e.g. Scheiner 2002).

variable over properties of plural events (where plurality includes singularity) and σ is the sum operator of Link (1983).

$$(20) \text{ ITER} \rightsquigarrow \lambda P \lambda e \lambda w [P(e, w) \ \& \ e = \sigma e' [P(e', w) \ \& \ e' \subset e]]$$

e is an ITER(P)-event in w iff e is a sum of P-events in w , where the sum has proper P-subparts, i.e. it consists of at least two P-events.

The definition of INIT is provided in (21). Hab does not require the actualization of the predicate P, but does require some initiating event, an event which P-initiates the state s :

$$(21) \text{ INIT} \rightsquigarrow \lambda P \lambda s \lambda w \exists e [\tau(e) < \tau(s) \ \& \ e \text{ is an event indicating a disposition for P in } w]$$

A state s is P-initiated in world w iff there is a prior event e indicating a disposition for P in w . The notion of "indicating-a-disposition" is not further decomposed, but it concerns events which satisfy either P itself (e.g. 22a-b) or something like the signing of a contract in (22c) or the manufacturing of an inanimate object with particular telic qualia in (22d), etc.

- (22) a. John smokes.
 b. Bob jumps 8.90 meters.
 c. Mary handles the mail from Antarctica.
 d. This machine crashes oranges.

Habituals are thought to be actualized, i.e. instantiated in the actual world, while generics do not require actualization. Boneh & Doron's way of defining habituals as based on dispositions considers the issue of actualization in the current world from a slightly different angle. Under this view, event iteration occurs in alternatives to the actual world, which are worlds where nothing inhibits the disposition from being manifested habitually. But in the actual world, nothing is required to occur beyond the initiating event, therefore there is no requirement for further actualization, only for the manifestation of a disposition. In the case of many habituals (e.g. 22a-b), the initiating event will itself simply satisfy P. This fact is what allows (23a) to be felicitous when said while the addressee smokes for the first time; and what allows the ascription of a habit to the prime minister in (23b):

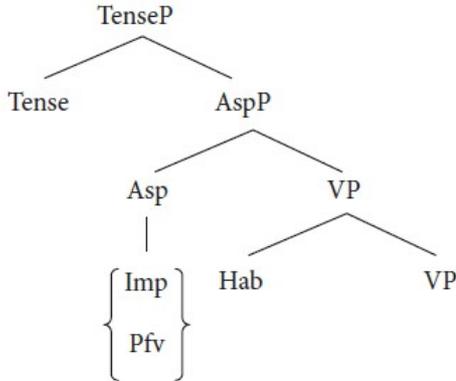
- (23) a. When did you start to smoke?
 b. Look, the Prime Minister dyes his hair!

(adapted from Vogeleer 2012, ex. 14c)

In these cases, the manifestation of the disposition is the first event of the habit in the actual world (INIT), and the habit is based on the existence of event summation (ITER) in all the accessible worlds. We return to this in section 5.

Compositionally speaking, Hab is a modal VP-level operator, attached below AspP:

(24)



The analysis presented here of the operator Hab underlying bare habitual sentences leads to predictions that can be tested empirically. Specifically, we expect that in bare habitual sentences lacking overt quantification, an indefinite singular has only wide scope with respect to event iteration, and the habit can be viewed both perfectly and imperfectly.

In the next section, two English past tensed verb forms, customarily used to express habituality, are reviewed: the simple past form and *would*.⁶

4 Evidence for Hab: Habitual forms in English

Let us start by considering the following context, which indicates that *would* obligatorily requires an explicit restrictor. The simple form may or may not have one:

- (25) (At the opera). Look at how sloppily people are dressed.
- a. In the good old days, people dressed elegantly.
 - b. # In the good old days, people would dress elegantly.
 - c. In the good old days, people would dress elegantly to go to the opera.

Second, *would* differs from the simple form in that an indefinite singular may also have narrow scope:

- (26) a. I received eight more treatments, and the temporary amnesia became severe. I thought nothing bad about the treatments, however, for I was given a wonderful anesthetic. When I awoke, a kind nurse **would be sitting** beside me with warm milk for my stomach if it hurt. (Internet)
- b. I received eight more treatments, and the temporary amnesia became severe. I thought nothing bad about the treatments, however, for I was given a wonderful anesthetic. When I awoke, a kind nurse **sat** beside me with warm milk for my stomach if it hurt.
- (27) a. When I was young, I would babysit a kid.
- b. When I was young, I babysat a kid.

In (26a), nurses vary with episodes described in the sentence with *would*, whereas only one

⁶ This discussion has been presented in Boneh & Doron (2013), and it includes also the form *used to*. There, similarly to Binnick (2005, 2006), *used to* is presented to be a complex aspect which selects stative VPs, habitual or not (see also Comrie 1976). In other words, synchronically, it is not a form that is dedicated to encoding habituality.

nurse regularly sat beside the patient's bed with the simple form in (26b). In the case of indefinite singulars in object position, again kids vary in the babysitting episodes expressed with *would* in (27a), but in (27b), like in (18a), with the simple form, only one kid was repeatedly guarded.

These two forms also differ as to their aspectual properties. Whereas the habit expressed with *would* can only be viewed imperfectively, the one with the simple form can be either perfective or imperfective.⁷

If we consider first how the temporal extent of the habit patterns with respect to *when*-clauses, both *would* and with the simple form seem to express habituals that only include the event expressed in the *when*-clause. This means that an imperfective interpretation arises for both forms here.

- (28) a. When I met her, Yael slept during the day and worked at night.
 b. When I met her, Yael would sleep during the day and work at night.

However, when considering frame adverbials like *in the 80s*, a difference between the forms becomes visible.

- (29) a. In the 80's, John went to work by bus.
 b. In the 80's, John would go to work by bus.

The simple form in (29a) can be interpreted both perfectively and imperfectively, namely the habit of going to work by bus can be understood to span part of the 80s (perfective interpretation), or to have started before the 80s and continue past the 80s. In (29b), only the second interpretation is available. Similarly, when a durational adverb is added, a perfective interpretation easily obtains in (30a) with the simple form, but is infelicitous with *would*. (30b) is only good under the unlikely situation where the subject's referent has a habit of working in the garden for three years, and this habit stretches throughout the 80s and beyond. In other words, when *would* is used, a durational adverb cannot measure the length of a habit expressed with *would*.

- (30) a. In the 80's, I worked in the garden for three years.
 b. #In the 80's, he would work in the garden for three years.

To summarize, we have seen that the two verbal forms exhibit correlated properties. The simple form, which does not require an overt quantificational expression to yield a habitual reading, triggers a 'wide scope only' reading for a singular indefinite and is flexible with respect to view point aspect in bare sentences. *Would*, on the other hand, obligatorily appears in sentences featuring overt quantification; the indefinite singular may have either wide or narrow scope and these sentences are only interpreted imperfectively. We take this to follow from a distinction between Hab and Gen. Hab underlies the simple form in bare quantifierless sentences, whereas *would* appears when there is a covert Gen operator. Contrary to Gen, Hab does not have to have an obligatorily overt restrictor. The wide scope of the indefinite comes from the existential quantification over the sum of events. This leads to a situation in which the direct object is not multiplied over the events instantiating the habit; in other words, it escapes the scope of the habitual operator (cf. Kratzer 2008). This property renders Hab distinct from Gen, which is quasi-universal. The syntactic positioning of Hab below

⁷ Note that we are considering the aspectual properties of the overall habit, not the aspectual properties of its instantiating episodes.

AspP enables it to freely interact with viewpoint aspect. Gen, in contrast, is available higher up in the clausal architecture, and selects for an imperfective aspect.

Having focused now on habituals in bare characterizing sentences and shown how they pattern differently from generics in quantificational characterizing sentences, we return to dispositional statements, and show that they too are distinct from generics but are quite similar to habituals.

5 Common properties of habituals and dispositionals in bare characterizing sentences

To recall, the semantics of bare habituals is built on the notion of disposition that is constant in all accessible worlds of the modal base. Under the definition of Hab, the issue of instantiation in the actual world depends on the INIT meaning component and the particular conversational background. As stated above in section 3, the manifestation of the disposition to carry on a habit has to occur in the actual world. The habit itself, which is based on summation of events that occur in all accessible worlds may exclude the actual world. This way we may have habits that are only instantiated once in the actual world – if the first occurrence is of the same type of the event itself, like smoke, discussed in (22a), (23a). In order to illustrate this further, consider a context where Ruti recently started a new job, and she decided to go to work by bus. She only went there once, and shortly after that she died. In a eulogy, one could truthfully say:

(31) Ruti was such a modest person. She went to work by bus.

The example certainly cannot be interpreted episodically, although only one event occurred in the actual world. The example expresses that Ruti was disposed to go to work by bus – this was a decision she made. This would have turned into Ruti's habit, had she not died in the actual world.

In comparison, with respect to examples such as (22d) (*This machine crushes oranges*), the event that counts for INIT are particular telic qualia, and summation of events occurs in all the accessible worlds, even if the actual world is not included in the set of accessible worlds.

In other words, if the event relevant for indicating a disposition that counts for INIT is of the same kind as P, there will always be an instantiation in the actual world. If, on the other hand, what counts for INIT is the signing of a contract, the telic qualia of an object, or some relevant commitment, no instantiations in the actual world have to take place, but summation over events does occur in all accessible worlds. In this way, cases like (22a-b) can be treated on a par with cases like (22c-d).

Finally, aspectual properties of habituals and dispositionals also indicate that they pattern alike, contrary to generics, which were shown to be always imperfective (see also Lenci & Bertinetto 2001). Habituals and dispositionals can be expressed with perfective, imperfective and progressive aspect.

Although not discussed much in the literature, the progressive need not be episodic (cf. Rothstein and Landman 2014). (32a) seems to express a short termed habit, compared to the habit described in (32b).

- (32) a. They are issuing visas at the consulate.
 b. They issue visas at the consulate.

In the following pair, a dispositional reading seems more salient (see discussion of example (6) in section 2).

- (33) a. They are issuing any type of visa at this consulate these days.
 b. They issue any type of visa at this consulate.

So bare characterizing sentences in the progressive give rise to both habitual and dispositional readings.

Next, consider the following examples from French, a language that morphologically distinguishes between perfective and imperfective. The following examples illustrate perfective or perfect habituais, similar to the English examples in (29a) and (30a):

- (34) a. Marie a gardé un enfant (pendant deux ans).
 ‘Mary looked.PFV after a child (for two years).’
 b. Marie a dirigé une entreprise (pendant cinq ans).
 ‘Mary ran.PFV a company (for five years).’ (Vogeleer 2012, ex. 12)

Here, the habit of babysitting a child (a wide scope indefinite) is bounded in time (34a), and so is Marie's running a company (34b). In French, the perfective *passé composé* form may also feature in sentences giving rise to a clear dispositional reading:

- (35) La carte a permis pendant dix minutes seulement d’entrer dans la bibliothèque.
 ‘The card permitted.PFV for ten minutes only to enter the library.’

Mais stupidement je n’en ai pas profité.
 ‘But stupidly, I didn’t enjoy the opportunity.’

- (36) Notre nouveau robot a même pu repasser les chemises à un stade bien précis de son développement.
 ‘Our new robot could.PFV even iron shirts at a particular stage of its development.’

Mais on a supprimé cette fonction (qui n’a jamais été testée) pour des raisons de rentabilité.
 ‘But we suppressed this function (which was never tested) for rentability reasons.’
 (Mari & Martin 2007, ex. 6-7)

In (35)-(36), an overt modal word (*a permis* ‘permitted’; *a pu* ‘could’) is available but no concrete event takes place in the actual world; what seems to be bounded in time is the temporal extent of the disposition of the card in (35) and the robot in (36). These examples are assimilated to those in (22c-d), where what falls under the scope of the perfective viewpoint aspect is the event indicating a disposition, without there being event iteration in the actual world, only in the other accessible worlds.

To sum up, the fact that habitual and dispositional readings are available under both perfective and imperfective viewpoint aspect, as well as the progressive in English, provides some further indication for analyzing the covert modal giving rise to both reading as belonging at the VP-level.

6 Conclusion

The outcome of the current discussion is that there seem to be no sound linguistic criteria to set apart dispositional readings from habitual readings in bare generic sentences, which pattern differently from quantified characterizing sentences. I have suggested that the semantics of Hab as defined by Boneh & Doron (2010, 2013) can be extended to cover the dispositional reading. This has been done in a somewhat indirect way: first by suggesting that habitual and

dispositional statements do not feature covert operators with distinct quantificational force, then by suggesting that the readings are not a case of ambiguity, and finally by indicating that, unlike generics, they interact in a similar manner with viewpoint aspect, suggesting that they are both due to a VP-level covert operator.

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The Hebrew University of Jerusalem
nora.boneh@mail.huji.ac.il

What does ‘be capable’ tell us about capacities? An answer from Romance

Elena Castroviejo
Isabel Oltra-Massuet

This paper investigates the semantics of the Spanish expression *ser capaz* ‘be capable’ [SC henceforth]. On the one hand, it reflects on how languages encode capacity ascriptions. In particular, a comparison is drawn between SC and *have the capacity*. On the other hand, it delves into the meanings denoted by SC as a modal. Building on previous work (Castroviejo and Oltra-Massuet 2015, In press), we show that SC has both an abilitative and an epistemic-like interpretation, which we discuss and qualify, and characterize SC’s additional ‘unusual’ inference as a willful component.

Keywords: capacities, abilities, capable, modality

1 Introduction

In the context of discussing what dispositions are and how they should be characterized, one goal of this paper is to reflect on the notion of capacity, and, more specifically, to find out what *be capable* – a modal that seems to rely on capacities – can tell us about this kind of disposition. To this effect, we draw a comparison between English *be capable* and *have the capacity*, and between *be capable* and *be able*. However, our focus is on Spanish *ser capaz* ‘be capable’ [SC henceforth], as illustrated in (1).

- (1) Hobbes fue capaz de traducir la obra completa de Homero a los 86 años.
Hobbes was PERF capable of translate the work complete of Homer to the 86 years
‘Hobbes was capable of translating the complete works of Homer at 86.’
From Castroviejo and Oltra-Massuet (2015:60)

Our second goal is to delve into the semantics of SC. In particular, we will provide evidence that SC has both properties of abilitative modals like (1) and epistemic modals exemplified in (2), and will lay out the first steps of an analysis that can account for these different readings. As with other ‘ambiguous’ modals, such as English *must*, we will assume that the two readings derive from a difference in syntactic position and in the content of the modal base.

- (2) Mi hijo es capaz de haber resuelto el caso sin acudir a la policía.
my son is capable of have resolved the case without turn-to to the police
‘My son is capable of having solved the case without going to the police.’
From Castroviejo and Oltra-Massuet (2015:60)

Finally, we further comment on an additional meaning component of SC constructions, namely

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an 'unusual reading' (Castroviejo and Oltra-Massuet 2015), which treats the pre-jacent of the modal as something extraordinary, daring or remarkable. Thus, in both (1) and (2), translating Homer's works at 86 and solving the case without going to the police are quite an achievement.

1.1 On dispositions, abilities and capacities

In *Stanford Encyclopedia of Philosophy's* entry on abilities, Maier (2010) provides some characteristics of dispositions. We are interested in identifying the relationship that exists between abilities and dispositions.

Dispositions are said to be properties picked out by predicates like 'is fragile', 'is soluble', which are paraphrased as 'x is disposed to break when struck' or 'x is disposed to dissolve when placed in water.' In this sense, dispositions are inherently modal, since they refer to result states that need not be the case in the actual world; they only hold when 'the right conditions' apply. Likewise, abilities can exist even when not manifested. However, it does not necessarily hold that the property is manifested once the right conditions are met.

In the philosophical literature, a distinction is sometimes established between dispositions and **powers**. The latter have two properties: (i) they are possessed by agents and (ii) are typically expressed by the modal *can*. Crucially, abilities are considered to be a particular kind of power that relates its **agent** to an **action**. The subject being an agent, s/he may decide to realize or not realize the mentioned action, unlike a regular disposition. This makes powers existential modals, i.e. a power *can* be realized, but it does not have to (Cohen, this volume). In a nutshell, abilities are considered to be a type of disposition because the result state need not be manifested, but their subject is an agent that is related to an action. Thus, 'is soluble' cannot be considered an ability because the subject of the predicate is not an agent, and the result of the predicate in the right conditions is a state rather than an action. On the other hand, an individual can have the ability to jump a fence. She may end up not jumping that fence – so the action is not necessarily manifested – but the subject needs to be an agent, who is related to this particular action.

Are abilities and capacities the same? Cartwright (1989) explores the status of **capacities** (or rather 'attributions of capacities') in connection to causality. One such attribution would be an expression such as *Aspirins relieve headaches*. She assumes that capacities do not need to have sentient subjects (individuals who have a will and understanding). And yet, even if the right conditions are met, aspirins do not always relieve one's headache. Their force is hence existential. Drawing on these thoughts and building on Maier's (2010), among others, Cohen (this volume) proposes that there is something else called 'capabilities', which includes properties of both abilities and capacities, namely being active dispositions, relating an agent to an action, and having existential modal force.¹

In this paper, we concentrate on the linguistic expression of capacities – or rather capabilities, a notion that does not have an obvious translation in Spanish – by focusing on apparently analogous expressions such as *be able*, *be capable*, *have the ability*, *have the capacity*, and their Spanish counterparts.

¹We refer the interested reader to Cohen (this volume) for the full-fledged idea behind the 'square of disposition'.

1.2 Starting point

It has been noted in the linguistic literature (Thalberg 1972, Piñón 2003, Mari and Martin 2007, 2009) that (3a) and (3b) are not equivalent.

- (3) a. Brown *was able to* hit three bull's-eyes in a row.
 b. Brown *had the ability to* hit three bull's-eyes in a row.

Specifically, (3a) could be uttered to express an action that was achieved by accident. In contrast, (3b) conveys that hitting three bull's-eyes in a row is an action that Brown can carry out whenever he wants to. It is temporally persistent and repeatable.

At first sight, this extends to SC, but some non-trivial issues arise. If we say (4), it seems that there is a straightforward parallel with (3a) in that they both involve results that could be accidentally achieved.

- (4) Brown fue capaz de dar en la diana tres veces seguidas.
 'Brown was capable of hitting three bull's-eyes in a row.'

Now, if we carry out the same task for (3b), we realize that the linguistic expression *have the capacity to hit three bull's-eyes in a row* seems infelicitous. Intuitively, hitting three bull's-eyes in a row may be considered an ability, but probably not a capacity.

It is the purpose of next section to identify further differences between *have the capacity* and SC. To do so, we delve into how capacities (or rather, *capacidades*) are linguistically encoded in Spanish.

1.3 Main claims

Our main claims are summarized as follows: first, SC and *have the capacity* are different in many respects, even beyond the observation that we have exemplified with *be able*. However, we show that SC does rely on some of the subject's capacities, namely non-standard or 'specialized' ones. In particular 'x is capable of VP' in Spanish can be paraphrased as 'x can VP' if x resorts to such specialized capacities. From this, a number of inferences are generated. To begin with, the pre-jacent must denote an action that requires resorting to non-regular capacities. This yields either an effort or a daring component. Additionally, it yields a so-called *willful* reading, whereby it solely depends on the subject's will to carry out the action denoted by the pre-jacent. We finally claim that SC is an unstable modal, which is in the process of also acquiring epistemic values.

2 The linguistic encoding of capacities

In this section we sketch an overview of how capacities, broadly understood, are expressed in Spanish. Though not exhaustive, this list attempts to show that languages overtly convey distinctions that may turn to be relevant for our theory of capacity and ability.

Let us start with intrinsic capacities. By these, we mean those skills that are inalienable properties of a particular species. For instance, flying or breathing under water. To express such capacities, Spanish can use *poder* 'can' or *tener la capacidad* 'have the capacity' of flying or breathing under water, (5a). Note that (5b), with SC, is infelicitous.

- (5) a. El águila real {puede / tiene la capacidad de} volar.
 'The royal eagle can / has the capacity to fly'

- b. #El águila real es capaz de volar.
the eagle royal is capable of fly

Now, we can think of externally assigned or alienable capacities. This meaning is probably not included in the denotation of English *capacity*, but it is definitely there in Spanish *capacidad*. This covers actions such as calling an election, christening a boat, marrying a couple or putting someone in jail. These can be expressed with *poder* 'can', *tener la capacidad* 'have the capacity' and also *estar capacitado* 'be qualified' to call an election, christen a boat, etc., (6a). Again, notice that SC is infelicitous in this context, (6b).

- (6) a. El alcalde {puede / tiene la capacidad de / está capacitado para} casar a una pareja.
'The mayor {can / has the capacity to / is qualified to} marry a couple.'
b. #El alcalde es capaz de casar a una pareja.
the mayor is capable of marry to a couple

Third, there are skills that require learning or training, such as cycling, speaking languages, or solving crosswords. Spanish uses the verb *saber* 'know (how)', (7a). Here, note that neither SC nor *poder* 'can' can felicitously express these properties, (7b). In fact, they are acceptable but not equivalent to (7a). We will come back to what these mean in subsequent sections.

- (7) a. María sabe ir en bici.
'Mary {knows how to / can} ride a bike.'
b. María {puede / es capaz de} ir en bici. (not equivalent to (7a))
'Mary {can / is capable of} ride/ing a bike.'

Fourth, there are skills that do not require previous learning but which do involve reasoning (or other cognition-related mechanisms). For instance, identify the leader among the crowd, or consolidate and unify the monarchy. These are expressed with *saber* 'know (how)', *poder* 'can', *tener la habilidad* 'have the ability', and also SC, (8).

- (8) Manolo {sabe / puede / tiene la habilidad de / es capaz de} identificar al líder en la multitud.
'Manolo {knows (how to) / can / has the ability to / is capable of} identify/ing the leader among the crowd.'

Fifth, we encounter remarkable, non-cognitive skills, such as hitting three bull's eyes in a row (Thalberg 1972), or making the world record in the 100 meter sprint (Piñón 2003). These are expressed with *poder* 'can', *tener la habilidad* 'have the ability' or SC, (9).

- (9) Pedro {pudo / tuvo la habilidad de / fue capaz de} dar en la diana tres veces seguidas.
'Peter {could / had the ability to / was able to} hit three bull's eyes in a row.'

Finally, we consider remarkable actions that are not triggered by skill but by effort, such as climbing Mt. Everest, or eating four pies in 30 minutes. Spanish uses *poder* 'can' and SC, (10).

- (10) Teresa {pudo / fue capaz de} escalar el Everest.
'Theresa was {could / was capable of} climb/ing Mt. Everest.'

Out of the six different dispositions that we have identified, *tener la capacidad* 'have the capacity' is only acceptable to express the first two, whereas SC is acceptable in the last four.

Therefore, they systematically express different meanings and seem to stand in complementary distribution.

We can thus conclude that the contrast is not only between *be able* and *have the ability*. SC does not have the same distribution as *have the capacity*, *have the ability* or *can*. Furthermore, *have the capacity* and *have the ability* also exhibit linguistically relevant differences. This does not rule out that there may be cross-linguistic differences in the encoding of capacities.

Building on this last thought, we now turn to the examination of the differences between SC and English *be able*.

3 SC vs. *be able*

While English has both *be capable* and *be able*, Spanish only has SC as the *apparent* right translation for both terms. Let us consider the properties they have in common, and especially those where they differ.

Both SC and *be able* are abilitative modals, even the most prototypical cases thereof. In addition, they both include an effort component analogous to the one in implicative verbs (e.g. *manage*, cf. Karttunen 1971). This is illustrated for Greek *borese* ‘can’ in (11). As Giannakidou and Staraki (2013) point out, even in cases which do not a priori require an effort (like fixing the car or escape), the effort component is accommodated.

- (11) O Janis borese na sikothi.
 the John can.perf.past.3sg subj.c stand-up.perf.nonpast.3sg
 ‘John was able to stand up—it was a difficult thing!’
 From Giannakidou and Staraki (2013:254)

The same holds for its English translation with *be able* and with SC (Castroviejo and Oltra-Massuet In press), as exemplified in (12).

- (12) Juan fue capaz de levantarse.
 ‘Juan was capable of standing up.’

Here, standing up is seen as an action that takes some effort, maybe because e.g. Juan has been sick recently or he has just received a punch in a fight.

Focusing on *be able* more specifically, Piñón (2003) argues that this abilitative modal has both an abilitative and an opportunity reading. This latter interpretation is the one in (13), which can be paraphrased as *had the opportunity* (rather than *had the ability*).

- (13) “During the rehearsals, I was able to sit and watch [Rodgers] work every day,” he said.
 (WP, 12 Feb. 03, p. B06)
 From Piñón (2003:385)

Interestingly, the opportunity reading is absent from SC. (14) is not equivalent to (13).

- (14) Durante los ensayos, fui capaz de sentarme y observar a Rodgers trabajar todos los días, dijo.
 ‘During the rehearsals, I was capable of sitting and watching Rodgers work every day, he said.’

There is another respect in which these two modal expressions differ, namely the interpretation

of the simple present. Take Bhatt's (1999) example in (15). This piece of data is actually presented as evidence of *be able*'s effort component.²

- (15) a. #Timmy is able to breathe.
 b. Timmy had a terrible car accident as a result of which he lost control over most of his muscles. Thankfully, he is able to breathe.
 From Bhatt (1999:11)

Certainly, when breathing is taken as an activity that involves some additional effort, then *be able* is acceptable. However, we are interested in the fact that *be able* can be used in the present tense in a situation where the actuality of the complement is allowed. That is, in (15b), Timmy is actually breathing (he is not getting ready to breath when the right conditions are met).

By contrast, if we turn to SC, the outcome is quite different, (16).

- (16) [Manuel tuvo un terrible accidente de coche cuyo resultado fue la pérdida de control de sus músculos.] #Por suerte, es capaz de respirar.
 'Manuel had a terrible car accident as a result of which he lost control overmost of his muscles. Thankfully, he is capable of breathing.'

Crucially, even with the contextual enrichment, which makes clear that breathing would take an extra effort, (16) is not acceptable. Moreover, (16) cannot be interpreted as (15b) in the sense of *is breathing*, which is available in *can breathe* and its Spanish counterpart *puede respirar*. In the present tense, SC seems to necessarily refer to a non-manifested property.

Finally, SC and *be able* differ in another striking property. As discussed in Castroviejo and Ultra-Massuet (2015), SC seems to allow for an epistemic reading (see §4 for a more thorough elaboration), while this is absent from *be able*. In other words, SC can be used with an impersonal predicate, such as a weather verb, to express the speaker's conjecture, (17a), but this option is ruled out for *be able*, (17b).

- (17) a. Es capaz de llover.
 'It's capable of raining.'
 b. *It's able to rain.

Summing up, the two abilitative modals SC and *be able*, though apparently very similar in meaning, show non-trivial differences that a systematic analysis should be able to make explicit. We can conclude from this that SC and *be able* do not only differ in their distribution but also in their interpretation, and that abilitative modality is not a uniform phenomenon once we look at specific expressions.

Before we move on to the analysis, let us briefly consider some data to reflect on SC's epistemic reading.

4 An epistemic SC?

It has been noticed that (at least) certain Romance versions of SC allow for an epistemic reading. To our knowledge, this was first pointed out for Portuguese in Oliveira (2000), (18).

²Bhatt has an analysis whereby *be able* is a fake modal, comparable to *manage*. See (Bhatt 1999) for the details and qualifications of this claim.

- (18) From Oliveira (2000:3)
- a. Ele foi capaz de chegar a horas.
he was able of arrive to hours
'He was able to arrive on time.' [Abilitative]
- b. Ele é capaz de chegar amanhã.
he is able of arrive tomorrow
'He may arrive tomorrow.' [Epistemic]

The availability of such a reading, paired up with some grammatical differences, was developed for Spanish in Castroviejo and Oltra-Massuet (2015). (19a) is the abilitative SC and (19b) corresponds to the epistemic one.

- (19) From Castroviejo and Oltra-Massuet (2015:60)
- a. Hobbes fue capaz de traducir la obra completa de Homero a los 86 años.
Hobbes was.PERF capable of translate the work complete of Homer to the 86 years
'Hobbes was capable of translating the complete works of Homer at 86.'
- b. Mi hijo es capaz de haber resuelto el caso sin acudir a la policía.
my son is capable of have resolved the case without turn-to to the police
'My son is capable of having solved the case without going to the police.'

A further grammatical development in this direction is found in some varieties of American Spanish, as attested by e.g. Grández-Ávila (2010), (20) (our glosses). Observe that instead of *capaz de* 'capable of', here we have *capaz que* 'it is capable that.'

- (20) a. Todo el mundo lo va a creer, y yo mismo, si mañana lo leo en el diario, es **capaz que** lo creo.
all the world it goes to believe and I self if tomorrow it read in the newspaper is capable that it believe.I
'Everybody will believe it, and I myself, if tomorrow I read this in the paper, (it) is possible/likely that I believe it.'
(Walsh Cuento para tahúres y otros relatos policiales [Argentina 1951-61])
- b. **Capaz que** hasta resulte un buen senador.
capable that even turns-out a good senator
'Maybe/ Possibly he even turns out to be a good senator.'
(Donoso El obsceno pájaro de la noche [Chile 1970])

In what follows, we first briefly overview some grammatical tests that set apart the two readings, and then describe the existence of a reading we call *willful*, which fails to be classified under the abilitative or the epistemic rubric.

4.1 Selected diagnostics

In Castroviejo and Oltra-Massuet (2015:62-68) we propose a number of grammatical diagnostics that tease apart the two readings of SC, namely the abilitative [AB] and the epistemic [EP]. We present a few of those here and add some new ones.

First, only [AB] is compatible with perfective aspect on SC. That is, if the copula *ser* 'be' is

inflected in the simple past, [AB] necessarily arises, (21).³

- (21) a. Hobbes *fue* capaz de traducir las obras completas de Homero. [AB]
 'Hobbes was-PERF capable of translating Homer's collected works.'
 b. Mi hijo *fue* capaz de resolver el caso sin acudir a la policía. [AB]
 'My son was-PERF capable of solving the case without going to the police.'

Second, if the embedded verb (i.e. the one selected by SC) is in the perfective or progressive aspects, then [EP] necessarily arises, (22).

- (22) a. Este filósofo es capaz de *haber traducido* / *estar traduciendo* las obras completas de Homero. [EP]
 'This philosopher is capable of having translated / being translating Homer's collected works.'
 b. Mi hijo es capaz de *haber resuelto* / *estar resolviendo* el caso sin acudir a la policía. [EP]
 'My son is capable of having solved / being solving the case without going to the police.'

Third, when SC is in present tense, only [EP] can license the adverbial *cualquier día de estos* 'one of these days', (23). It is compatible with [AB] if SC is in future tense, (24).

- (23) Este filósofo es capaz de traducir las obras completas de Homero *cualquier día de estos*.
 a. It is possible that this philosopher translates Homer's collected works one of these days.' [EP]
 b. #This philosopher is capable of translating Homer's collected works one of these days.' [AB]
 (24) Este filósofo será capaz de traducir las obras completas de Homero *cualquier día de estos*. [AB]
 'This philosopher will be able to translate Homer's collected works one of these days.'

Fourth, [AB] requires the presence of a sentient subject that can have the ability that is attributed to him/her. Therefore, if the subject is not an agent, it is because SC has an [EP] reading, (25).

- (25) Este libro es capaz de ser un éxito de ventas.
 'This book is capable of being a best-seller.'
 a. This book might end up being a best-seller. [EP]
 b. #This book has the ability of being a best-seller. [AB]

Fifth, if the interlocutors are experiencing the ongoing event, [EP], which is supposed to express a conjecture, is infelicitous, but [AB] is acceptable.⁴ Consider the following scenario:

- (26) a. Context: everyone is contemplating Juan bathing in the river.

³Fabienne Martin (p.c.) points out to us the possibility that [EP] arises with the present perfect. Pending further testing, we do agree that *ha sido capaz* may be construed epistemically. The same holds with the verb *poder* 'can' in Spanish, as also observed for French and Italian in Mari and Martin (2007) and subsequent work.

⁴This test and the next one are based on Hackl's (1998) analysis of the readings of English *can*.

- b. Juan es (realmente) capaz de bañarse en el río en invierno. [AB] / #[EP]
 ‘Juan is (really) capable of bathing in the river in winter.’

By contrast, imagine a scenario where all interlocutors have witnessed the achievement of the event, as in (27). Here, the embedded verb is in the perfective aspect, so [AB] does not arise. On the other hand, since [EP], again, is supposed to express a (future-shifted) conjecture, the sentence cannot have an [EP] reading, either.

- (27) a. Context: everyone knows Juan has been bathing in the river.
 b. #Juan es capaz de haberse bañado en el río en invierno. *[AB] / #[EP]
 ‘Juan is capable of having bathed in the river in winter.’

From these data we could confirm that we are facing two different interpretations of a modal that relate SC to other better known modals (*can*, *must*). It also seems that the two readings have clear structural mappings, as was proposed in Castroviejo and Oltra-Massuet (2015).

Additional evidence comes from the fact that only [EP] allows for degree modification. Consider first the contrast pointed out by Mari (2015), (28).

- (28) a. Ha potuto **benissimo** rovesciare l’acqua dei fiori e rovinare così il parquet.
 b. Il a **très bien** pu renverser l’eau des fleurs et ainsi abîmer
 he has very well can.PERF spill the water of the flowers and so damage
 le parquet.
 the parquet
 ‘He may very well have spilled the water of the flowers and so damage the parquet.’
 From Mari (2015:123)

Here, the verb *potere*, *pouvoir* ‘can’ may be modified by the adverbials *benissimo*, *très bien* ‘very well’ and so we obtain the [EP] reading of *can*.⁵

When applied to *capaz* ‘capable’, since it is an adjective, it could in principle be modified by a degree expression such as *very*.⁶ Interestingly, though, *capaz* ‘capable’ only seems to be gradable in its [EP] reading, (29).^{7,8}

- (29) a. El águila es (??**mu**y) capaz de volar bajo el sol sin ser deslumbrada.
 ‘The eagle is (??very) capable of flying under the sun without being blinded.’
 b. Mi hijo es **mu**y capaz de haber resuelto el caso sin acudir a la policía.
 ‘My son is very capable of having solved the case without going to the police.’

Unless we are making a prediction, modification by *mu*y ‘very’ is unacceptable in (29a).

An additional strategy we can follow to distinguish the two readings is to make the modal

⁵The interpretive effect of composing these precise modifiers with the modal is left for future research. As pointed out to us by Fabienne Martin (p.c.), the fact that other degree modifiers are not available in this position may cast doubt on the idea that *benissimo* and *très bien* are grading probabilities or strengthening epistemic force.

⁶Kennedy and McNally (2005) show that English *able* can be modified by *well* but not by *very*. For an analysis of how *good* and *well* end up having the effect of degree boosters, see Castroviejo and Gehrke (2015).

⁷We should mention that *capaz* can in fact be modified by *perfectamente* ‘perfectly’ in its [AB] reading. We leave the analysis of this data point for future research.

⁸Fabienne Martin (p.c.) observes that the [AB] version of SC could be compatible with *más o menos* ‘more or less’. This is indeed the case, which suggests that *capaz* behaves like an absolute or closed scale adjective in its [AB] reading. We will elaborate further on this observation in future research.

base explicit. In particular, we assume the epistemic reading can be introduced by *Knowing x* while the abilitative reading can be introduced by *In virtue of x's capacities*. Compare (30) with (31).

- (30) a. **Conociendo a mi hijo**, es capaz de haber resuelto el caso.
'Knowing my son, he's capable of having solved the case.'
b. ??**En virtud de sus capacidades**, mi hijo es capaz de haber resuelto el caso.
in virtue of his capacities my son is capable of have solved the case
- (31) **En virtud de sus capacidades**, el águila es capaz de volar bajo el sol sin ser deslumbrada.
'In virtue of its capacities, the eagle is capable of flying under the sun without being blinded.'

The abilitative modal base is not acceptable with SC when it embeds a verb in the perfective form, (30b), which we have assumed is a diagnostic for [EP]. However, it is fine when the pre-jacent does not have overt aspectual marking.

A further test concerns the speaker's degree of commitment, which should be weaker for epistemic modals (Martin 2011). This is illustrated below with the addition of the phrase *Con toda seguridad* 'most certainly', which is only felicitous with the abilitative reading in (32a).

- (32) a. **Con toda seguridad**, el águila es capaz de volar bajo el sol sin ser deslumbrada.
'Most certainly, the eagle is capable of flying under the sun without being blinded.'
b. ??**Con toda seguridad**, mi hijo es capaz de haber resuelto el caso.
with all security my son is capable of have solved the case

Building on Brennan (1993), we can also distinguish between the two readings by means of the (un)availability of the equivalence with the *-ble* derivation. Take for instance the contrast in (33).

- (33) a. La mesa es capaz de desmontarse en plena función.
'The table is capable of falling apart in the middle of the play.'
b. ≠ La mesa es **desmontable**.
the table is disassemble-ble

(33a) has the epistemic reading, because the subject is not an agent. Clearly, the sentence in (33b), which can only give rise to what Cohen (this volume) would call a *passivity* interpretation,⁹ is not its equivalent.

These and further tests are indicative of the existence of a reading that has evolved from its original abilitative core, which is in line with diachronic work on semantic change for modals (c.f. e.g. Traugott 1985, Bybee et al. 1994, Narrog 2012).

4.2 The willful reading

In this section we would like to draw the reader's attention to an additional feature of willfulness that SC can contribute. Consider a sentence like (34), which cannot easily be attributed an abilitative or an epistemic reading.

⁹Thanks to Fabienne Martin for pointing this out to us.

- (34) Belén Esteban es capaz de escribir novelas si con eso consigue intervenir en los programas del corazón.
 ‘Belén Esteban is capable of writing novels if that allows her to be in romance shows.’

For an optimal interpretation of this sentence, one needs to know that Belén Esteban is a Spanish TV icon who started to be one because she was once married to a bull fighter. She is not precisely well known for her intellectual skills. Hence, the quirk of the example is that if she realizes that writing a novel would bring her into the limelight, then she might feel in the mood to embark in such an enterprise. This type of sentences conveys that the subject can participate in a certain event if she happens to want or need to achieve a certain goal. Intuitively, the participation in the event solely depends on a sudden need or wish. That is why we have called this reading a *willful* interpretation.¹⁰

In cases like this, it seems that we can construct scenarios that are compatible with both, a capacity and a conjecture reading. (35) provides an abilitative context, (36) describes an epistemic one.

- (35) A: Para pasar a la siguiente fase del concurso, Belén Esteban debe escribir algo. ¿Crees que puede cumplir con este objetivo?
 ‘To move on to the second phase of the contest, Belén Esteban must write something. Do you think she can accomplish this goal?’
 B: Yo creo que es capaz de escribir una novela si así gana el concurso.
 ‘I believe she’s capable of writing a novel to win the contest.’
- (36) A: ¿Qué probabilidades hay de que Belén Esteban algún día se haga escritora?
 ‘How likely is it that Belén Esteban ends up being a writer?’
 B: Yo creo que cualquier día es capaz de escribir una novela si así gana popularidad.
 ‘I believe she’s capable of writing a novel any day to win popularity.’

A formal analysis of SC needs to address both the set of diagnostics that seem to suggest two modal flavors for SC, and the characterization of this so-called *willful* reading.

4.3 Interim summary

So far, we have shown that SC is not equivalent to *have the capacity*, because they do not overlap in distribution and also because the former has a potential epistemic reading that the latter lacks altogether. We have further presented empirical evidence that supports our claim that SC can neither be equated to *be able*.

Therefore, the questions that the analysis should address are the following:

1. What restricts the appearance of SC, especially, the ill-formedness of the breathing example (16)?
2. What is the status of the effort component in (12)?
3. What is the source of the *willful* reading (cf. §4.2)?

¹⁰Another option that we will not explore in this article is to treat unexpectedness – rather than willfulness – as the primitive or main component of this reading. We leave this option open to further consideration and thank Fabienne Martin (p.c.) for the remark.

5 First steps towards an analysis

To address the aforementioned questions, we outline an analysis of the semantics of SC that will first focus on its comparison with *be able* and the kind of disposition it denotes (§5.1). In §5.2 we then attempt to gain a better understanding of the so-called epistemic reading by contributing further data to the analysis.

5.1 SC in the simple present and the breathing example

In this subsection we discuss the kind of contrast exemplified in (37) and (38) between SC and *be able*, in the light of the previous literature on *be able* and abilitative modals (Bhatt 1999, Piñón 2003, Mari and Martin 2007, 2009).

- (37) a. #Timmy is able to breathe.
 b. Timmy had a terrible car accident as a result of which he lost control overmost of his muscles. Thankfully, he is able to breathe.
- (38) [Manuel tuvo un terrible accidente de coche cuyo resultado fue la pérdida de control de sus músculos.] #Por suerte, es capaz de respirar.
 'Manuel had a terrible car accident as a result of which he lost control overmost of his muscles. Thankfully, he is capable of breathing.'

5.1.1 *Previous accounts of 'be able'* As pointed out in §3, Bhatt (1999) brings up sentences like (37) to motivate the analogy between *be able* and *manage*. He further presents an account of the difference between ability attributions, (39a), and actuality implications (which have later been called *actuality entailments*, AE for short), (39b).

- (39) John was able to eat five apples in an hour.
 a. In those days, John was able to eat five apples in an hour. (past generic)
 b. Yesterday, John was able to eat five apples in an hour. (past episodic)

In brief, he proposes that *be able* in (39a) is a fake modal with the semantics of the implicative verb *manage*, and (39b) is under the scope of an imperfective aspectual operator, which yields the lack of AE.

Let us now turn to Piñón (2003), who connects the availability of AE with two different readings of *be able*. He identifies an 'ability *able*', (40), and an 'opportunity *able*', (41).

- (40) a. In her early twenties, Rebecca **was able to** swim across Lake Balaton.
 b. In her early twenties, Rebecca **had the ability to** swim across Lake Balaton.
- (41) a. By detecting subtle variations in the glow's warmth, scientists **were able to** discern the primordial structure of the universe a mere 380,000 years after its birth. (WP, 12 Feb. 03, p. 01)
 b. By detecting subtle variations in the glow's warmth, scientists **had the opportunity to** discern the primordial structure of the universe a mere 380,000 years after its birth.

These two readings correspond to a different behavior when it comes to AE, as illustrated in (42).

- (42) a. [(40a)] → In her early twenties, Rebecca swam across Lake Balaton.

- b. [(41a)] → Scientists discerned the primordial structure of the universe a mere 380,000 years after its birth.

Abilities are taken to be permanent (enduring, reliable), while opportunities may be transitory (come and go). The explanation of these facts rests on the scope between tense operators and the (historical) possibility modal, (43) and (44).

- (43) a. ability \rightsquigarrow Tense [Modal]
 b. opportunity \rightsquigarrow Modal [Tense]
- (44) a. No AE: at some time in the past it was possible for Rebecca to swim across LB.
 b. AE: it is possible for Rebecca to carry the action of swimming across LB at some point in the past.

This works straightforwardly for the past *was able*. It predicts that the AE is triggered when the modal is interpreted above tense. That is, taking (40a) as an example, the inference according to which Rebecca swam across Lake Balaton arises if we interpret that it is possible for Rebecca to swim across LB (where past is embedded under the historical possibility modal). The relevant question refers to the predictions it makes for abilitative modals **in the present tense**.

The case that most resembles the breathing example is Piñón's (2003) opportunity *able* in the present tense. Take (45), which does not strictly entail that the subject actually sits and watches Rodgers work every day, (45).

- (45) During the rehearsals, I am able to sit and watch Rodgers work every day.

Certainly, (45) does not have an AE, which could be framed under the assumption that we are facing an abilitative (not opportunity) *able*, so that tense scopes over the modal. However, notice that this would not prevent the potential actuality of the complement; there is indeed a reading (remember the breathing example), where the subject does sit and watch Rodgers work every day.

Turning now to SC, recall that the breathing example is ruled out in the present tense, (46).

- (46) #Manolo es capaz de respirar.
 Manolo is capable of breathe

Piñón's (2003) analysis cannot be applied to account for the unacceptability of SC in this scenario. Note that, if it were felicitous, it would not be compatible with a reading in which Manolo is actually breathing. Hence, the opportunity reading is unavailable for SC, which might imply that tense always scopes over the modal. However, SC does appear felicitously in other scenarios in the past, where there is an AE, as in (19a), repeated as (47) for convenience.

- (47) Hobbes fue capaz de traducir la obra completa de Homero a los 86 años.
 Hobbes was.PERF capable of translate the work complete of Homer to the 86 years
 'Hobbes was capable of translating the complete works of Homer at 86.'

In (47), Hobbes did translate the complete works of Homer, which apparently means that the opportunity reading arises in the past, but not in the present. There might be a way to extend Piñón's analysis to explain the behavior of *be able* in the present tense with respect to the actuality of the prejacent. However, it could hardly explain the behavior of SC, unless we are

ready to admit that *be able* and SC do not share the same building blocks.

Mari and Martin's (2007, 2009) work on the interpretation of abilitative modals takes up on Piñón's distinction and apply it to French. They propose a modified ontology and argue against a structural account of AE exclusively based on the syntactic scope between tense/aspect and the modal (cf. Hacquard 2006). According to them, abilities (and dispositions) come in two types (see also Giannakidou and Staraki 2013 for an extension of this approach when applied to Greek): generic vs. action-dependent.

Building on Kenny (1976), they assume there are Generic abilities (GAs) with the following properties:

- (i) They do not require verifying instances.
- (ii) They are ascribed to an agent *i* iff *i* can repeat the action whenever s/he wants to.
- (iii) By default they are unbounded (temporally persistent).
- (iv) They trigger a positive explanatory factor: "He was able to do it, so he did it."

In their account, *have the ability* and French *avoir la capacité* denote exclusively GAs, but *be able to* and *être capable de* have a broader extension.

Thus they further propose the existence of action-dependent abilities (ADAs), with the following properties:

- (i) They ontologically depend on the corresponding action.
- (ii) A unique and non-repeatable performance suffices to imply the corresponding ADA.
- (iii) They have the same temporal boundaries as the action on which they depend and are thus bounded.
- (iv) There is no explanatory factor. "He did it, so he was able to do it."

They conclude that *be able to* and *être capable de* can denote both GAs and the corresponding ADA. They further support the idea that there is no need to assume two lexical entries, but rather an underspecified semantics. The relevant reading is picked out through contextual factors like tense, aspect or rhetorical relations.

This theory is aimed to explain cases like (48), where the French modal *pouvoir* 'can' is in *Passé Composé* and, yet, no AE obtains.

- (48) Notre nouveau robot a même pu repasser les chemises à un stade bien précis de son développement. OK Mais on a supprimé cette fonction (qui n'a jamais été testée) pour des raisons de rentabilité.

'Our new robot could.PERF even iron shirts at a particular stage of its development. But we suppressed this function (which was never tested) for rentability reasons.'

From Mari and Martin (2009:10)

In (48), the adverbial in italics coerces the default GA, so that it stops being temporally persistent, but the fact that it is still a GA explains why AE does not obtain, despite the *Passé Composé* on the modal.

Going back to SC, let us consider its behavior in the past with respect to AEs.

- (49) a. María ha sido / fue capaz de escaparse, #pero no se ha escapado.
 Mary has been was.PERF capable of escape but NEG self has escaped
 ‘Mary has been / was capable of escaping, #but she didn’t do it.’
- b. Nuestro nuevo robot ha sido / fue capaz de planchar las camisas en un
 our new robot has been was.PERF capable of iron the shirts in a
 estadio preciso de su desarrollo. OK Pero hemos suprimido esta función ...
 phase precise of its development OK but have.we suppressed this function
 ‘Our new robot has been / was capable of ironing the shirts in a precise phase of
 its development. OK But we have suppressed this function ...’

As in the previous case, this account successfully explains the behavior of SC with perfective past tenses. However, its predictions for the simple present are unclear. The extension of this proposal does not seem to provide us with any straightforward explanation for the difference between *be able* and SC in terms of the distinction between GAs and ADAs and their interplay with tense, aspect and rhetorical relations. On the one hand, it looks as if SC should denote a GA only in the present tense; there is nothing explaining the infelicity of the breathing cases. On the other hand, it is unclear whether it predicts a compatible actuality of the complement of *be able* in the present tense, and whether this would classify these examples as GAs or ADAs.

Summing up, AEs-based analyses work for *be able* or *can* in past tenses, but they are not explicit about their predictions for the present tense. More importantly, they do not seem to help us understand the behavior of SC.

5.1.2 *Proposal* Our claims about abilitative SC (SC_{AB}) can be summarized as follows:

- (i) SC expresses that the subject can participate in the event denoted by the prejacent if s/he resorts to her specialized intrinsic capacities.
- (ii) SC in the present tense is incompatible with the (ongoing) actuality of the prejacent. It just expresses a capacity attribution (Bhatt 1999).

Let us now proceed to further develop and motivate our main claims. First, we take SC to be an existential modal whose specific lexical information is encoded in its modal base. Our tentative – though unsurprising – proposal for a sentence such as (50) is in (51).

- (50) El águila es capaz de volar bajo el sol.
 ‘The eagle is capable of flying under the sun.’
- (51) [[El águila es capaz de volar bajo el sol]]^{w,g} = 1 iff $\exists w' \in MB_{SC_{AB}}(\mathbf{the-eagle})(w)$
 [fly-under-sun(the-eagle)(w') = 1]

In prose, (50) is true in a world w with respect to abilitative modal base $MB_{SC_{AB}}(x)(w)$ if and only if there is a world w' compatible with the modal base in which the eagle flies under the sun. As to the modal base for SC_{AB} , we suggest (53), building on Giannakidou’s (2001) *ability* modal base for Greek *bori* and English *can* in (52). Note that the modal base is relativized to the subject, so as to restrict the set of worlds to those which are compatible with the subject’s specialized intrinsic capacities.

- (52) K-ability $(x)(w) = \{w' : \forall p[x \text{ is capable of } p(w) \rightarrow p(w')]\}$
- (53) $MB_{SC_{AB}}(x)(w) = \{w' : \forall p[x \text{ has the specialized intrinsic capacity to } p(w) \rightarrow p(w')]\}$

As in Kratzer (1981:et seq.) and Brennan (1993), MB is intersected with a stereotypical Ordering Source, which ensures that the worlds in MB are maximally similar to the evaluation world, and hence also include circumstantial information surrounding the subject and the action s/he is taking part in.

Although we will remain informal about it here,¹¹ let us elaborate on the concept of 'specialized intrinsic capacities', on the basis of some relevant examples. Consider Thomason's (2005) comment on his example (54).

(54) I can't write a check.

The reasons why the speaker cannot write a check may be e.g. his balance is negative or he cannot find his checkbook. A similar case can be made for *be able*, (55).

(55) That didn't do any good and now they have probably flagged me and I won't be able to write a check anywhere.

<http://www.consumeraffairs.com/debt/telecheck.html>

By contrast, a sentence like (56), with SC, is infelicitous in most scenarios. The motivations that license *can* and *be able* in (54) and (55) are not adequate in this context.

(56) No soy capaz de extender un cheque.
'I'm not capable of writing a check.'

Also, the reasons for not having climbed Mt. Everest, (57), cannot be that the climbing material got stolen or the bad weather. It has to be the subject's strength, self confidence, courage, or alike.

(57) No he sido capaz de escalar el Everest.
'I haven't been capable of climbing Mt. Everest.'

This suggests that a MB that contains worlds (or situations) that are related to the subject of the main verb is too wide, i.e. it is not a plain circumstantial modal. Rather, since SC has no access to an opportunity reading, it must invoke an MB whose worlds/situations are compatible with the subject's capacities. Interestingly, though, just picking out capacities in the broad sense may not be enough, either. Recall from §2 that *tener la capacidad* 'have the capacity' covers a wider range of capacities than SC, so (58a) ≠ (58b).¹²

(58) a. El presidente tiene la capacidad de convocar elecciones.
'The president has the capacity to call an election.'
b. El presidente es capaz de convocar elecciones.
'The president is capable of calling an election.'

¹¹A possible way to model it would be to adopt the idea of *widening* of alternatives in the sense of Kadmon and Landman (1993) and applied to negative polarity, according to which the set of usual alternatives is expanded to include non-standard ones. This has also been used to account for the semantics of exclamatives in Zanuttini and Portner (2003). Importantly, having a specialized capacity entails having all the regular, standard ones, but the inverse does not hold.

¹²Notice that (58b) is not ungrammatical. It is in fact acceptable under a willful reading. That is, it expresses that the president is so unpredictable that s/he can call an election, say, to fulfill some sudden wish.

So, it seems that we should appeal to intrinsic capacities to avoid deriving the equivalence between (58a) and (58b). We want to show, though, that this also falls short. Let us go back to an example like (56) or its interrogative counterpart in (59).

- (59) ¿Has sido capaz de extender el cheque?
‘Have you been capable of writing the check?’

Writing a check also involves intrinsic capacities, like moving arms and fingers, wanting to carry out this action, a relative degree of intelligence to fill it in properly, etc. And yet, the two sentences are only felicitous in very specific contexts. We claim that they are only acceptable if we assume that writing a check involves resorting to intrinsic capacities that go beyond the standard capacities any regular human being – or the same human being at different stages – would resort to in order to perform such an action. This is what we call *specialized capacities*. These are the ones you resort to in order to face unusual situations or to participate in non-standard events. So, we assume the existence of a varied set of standard capacities to be determined contextually (probably relying on a comparison class of individuals or stages of the same individual), and then another set of intrinsic capacities that one puts into play in special situations.¹³ Note that the addressee of (59) could in fact complain that the speaker is casting doubts on his set of standard capacities, since she is suggesting that he needs to resort to his specialized skills to carry out the action of writing a check.

From here, it is easy to derive the effort implication that is found in SC. Certainly, specialized capacities are put into play when the event is challenging. This usually – but not necessarily – triggers effort. Additionally, facing the participation in a somewhat challenging event will usually involve having a good reason to do so; hence, the frequent co-occurrence of SC with purpose clauses. Recall (34), repeated in (60) for convenience. The boldfaced sentence describes a purpose for engaging in writing novels.

- (60) Belén Esteban es capaz de escribir novelas ...
si con eso consigue intervenir en los programas del corazón.
‘Belén Esteban is capable of writing novels if that allows her to be in romance shows.’

Likewise, SC sentences are most productive in contexts where a specific need or wish is spelled out or activated in the Common Ground. Establishing a goal to be achieved accommodates the consideration of appealing to those specialized inner capacities.

Now, how do we derive the differences between SC and *be able* that we have pointed out in §3? For one, the MB for *be able* is not as constrained as the one for SC. Moreover, a thorough analysis of *be able* and *can* should explain how an ability attribution is compatible with its ongoing actualization. Nothing in the standard analysis of abilitative modals as existential quantifiers derives this output. This topic deserves further attention, but this is not a problem for SC_{AB}, which, in terms of AEs, we consider a well-behaved abilitative modal.

¹³We thank Fabienne Martin (p.c.) for pointing out to us that capacities can be specialized in two different ways, depending on whether they build on a comparison class which includes different individuals or different stages of the same individual. The latter would be necessary to account for cases in which e.g. the subject suffers from Parkinson and he manages to carry out an action that would not be a challenge for a healthy subject. In such cases, SC would be licensed.

5.2 *Qualifying the epistemic reading*

Now, we have shown that SC covers a wider range of meanings than *be able*. We have even presented extensive data that suggest that SC has an epistemic interpretation, along with its abilitative meaning. In Castroviejo and Oltra-Massuet (2015), we contributed a list of empirical diagnostics to tease apart two readings of SC and adopted a structural model along the lines of Hacquard (2006), but this is not unproblematic. It has been shown that such a model is not able to account for some of the Romance data (Mari and Martin 2007, 2009, Martin 2011). In this subsection we aim to provide counter-evidence to qualify the modal ambiguity of SC that would pair it with *can* or *must*. In particular, we will show that SC_{EP} is not a full-fledged epistemic modal, and will sketch an interpretation for it.

Let us start with a note on the interpretation of tense and aspect in root and epistemic modals, and the fact pointed out in §4.1 that the presence of perfective aspect in the embedded verb yields an epistemic reading. Stowell (2004) suggests that for abilitative modals *can* and *could*, a simultaneity reading between modal time and eventuality time is natural (in contrast to the rest of root modals, which favor a forward-shifted reading). Importantly, in SC_{AB} , the main tense of the sentence (i.e. the copula) provides the evaluation time, which can be PAST, PRES, FUT. Now, if the main tense of the sentence is PRES but the eventuality time is PAST (MOD-HAVE) or FUT (through an adverbial modifier such as *cualquier día* ‘any day’), then a division between modality time and eventuality time arises. In such cases of lack of simultaneity, the evaluation time remains the utterance time, which yields an epistemic-like interpretation.

This being true, there are reasons to believe that SC_{EP} is not a regular epistemic modal. For one, it only arises under a willful reading. This is not the case for Portuguese and Latin American Spanish in the case of *capaz que* ‘capable that’, but it is the case in Catalan.

Let us first consider weather predicates. Take (61) as a starting point.

- (61) Es capaz de llover.
‘It’s capable of raining.’

The sentence is certainly acceptable, but it does attribute an intention to the rain (or rather destiny or any force determining the course of events),¹⁴ as though it were a sentient subject that had the willful purpose to spoil our day. In fact, if we turn to other impersonal predicates such as existentials, they are not acceptable with SC, (62a), while an ambiguous modal such as *puede* ‘can’ is okay, (62b).

- (62) a. ??Es capaz de haber un tesoro en la isla.
is capable of have a treasure in the island
intended: ‘There may be a treasure in the island.’
b. Puede haber un tesoro en la isla.
may have a treasure in the island
‘There may be a treasure in the island.’

Something along the same lines applies to stative complements. The literature on modals (e.g. Zagona 1990, Condoravdi 2002) has shown that abilitative modals are incompatible with prejacents that denote states. SC can indeed have a stative complement, as shown in (63).

¹⁴We thank Fabienne Martin for this remark.

- (63) Pedro es capaz de estar enfermo.
‘Pedro is capable of being sick.’

However, it is also true that it is interpreted in such a way that the speaker is blaming Pedro for the possibility of being sick, as if he did it on purpose. In a sense, it is not clear that the situation is “beyond the control of the subject referent” (Boogaart 2007:48).

Finally, notice that the indiscriminate / indifference reading of the adverbial modifier *cualquier día de estos* ‘any day’, which contains a Free Choice Item (e.g. Quer 1998, Giannakidou 2001), matches the willful interpretation of SC, (64).

- (64) **Cualquier día**, Paula es capaz de matar a su suegra.
‘Any day Paula is capable of killing her mother-in-law.’

Paula is thus characterized as an individual who could kill her mother-in-law if she happens to have a good reason for it, but we cannot predict exactly when this will happen.

For this specific reading, it seems that the skills and capacities we are resorting to are even less standard and ordinary than the regular SC_{AB} . In fact, they are typically construed as unusual in the sense of peculiar. Hence, they license unusual and non-standard purposes and motivations, rather than an effort inference. This willful reading may have evolved from an ironic use of SC_{AB} . It has a root behavior, but it is also licensing epistemic-like interpretation.

Our claim is that SC is an unstable modal in the process of semantic change. The epistemic-like reading derives from a well-documented and widely attested development from root modals to epistemic ones (e.g. Traugott 1985, Bybee et al. 1994, Narrog 2012). Unlike regular epistemics, here the MB is relativized both to the speech act subject (the speaker) and the event subject. Hence, in examples such as (2), repeated in (65) below for convenience, the MB could be spelled out as “Given what **I** know **about (the unusual skills of) my son.**”

- (65) Mi hijo es capaz de haber resuelto el caso sin acudir a la policía.
‘My son is capable of having solved the case without going to the police.’

Therefore, we expect SC to license epistemic-like readings if there is a mismatch between modal and eventuality time. In such cases, a conjecture can be made on the basis of the unusual capacities of the event subject, which play an important role in the actualization of the prejacent. Hence, a sentence like (66a) is not equivalent to (66b).

- (66) a. Juan puede haber ganado la lotería.
‘John might have won the lottery.’
b. Juan es capaz de haber ganado la lotería.
‘John is capable of having won the lottery.’

While in (66a) the speaker collects evidence of all types (John’s desk is empty, the newspaper says there is a winner in town, his wife has been driving a new Porsche, ...), in (66b) our conjecture is based on the fact that he has such unusual skills (maybe he’s so annoyingly lucky) that he could even have won the lottery.

6 Wrap-up and prospects

6.1 Summary

In this paper we have argued that SC and *have the capacity* are different. Not only because the former can denote an action-dependent ability (or rather capacity). Unlike *have the capacity* SC is restricted to a modal base that picks out unusual skills (what we have tentatively called specialized intrinsic capacities), and it can derive an epistemic-like reading.

SC also differs in many respects from *be able to*, especially in the fact that SC, but not *be able*, is incompatible with the ongoing actuality of the prejacent. We can conclude from this study that abilitative modality does not exhibit a unified behavior. Abilitative modals deserve a thorough comparative analysis.

6.2 One last (and interesting) open issue

We conclude with an interesting open issue regarding *capaz* 'capable.' Throughout this paper, we have mostly treated SC as a modal expression rather than as an adjectival predicate of a copular construction. But *capaz* can also occur without the copula. Interestingly, in such cases, the restrictions of occurrence are not the same. Compare (67a) and (67b).

- (67) a. Ayer me compré una lámpara **capaz** de iluminar mi cuarto de 10m².
 yesterday me bought.I a lamp capable of light up my bedroom of 10m²
 'Yesterday, I got myself a lamp capable of lighting up my 10m² bedroom.'
- b. #La lámpara **es** capaz de iluminar mi cuarto de 10m².
 the lamp is capable of light up my bedroom of 10m²

Observe that the subject need not be a sentient individual if *capaz* is not preceded by the copula. Additionally, the prejacent need not refer to an extraordinary state of affairs. An explanation for this puzzling contrast is yet to be provided.

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(Castroviejo)
Ikerbasque and UPV/EHU
<http://elena-castroviejo-miro.cat/>

(Oltra-Massuet)
URV
<https://sites.google.com/site/isabeloltramassuet/>

The Square of Disposition

Ariel Cohen

I propose a classification of dispositions according to two parameters: (i) whether their argument is a causer, and (ii) whether they are *always* realized or only *sometimes* realized. This results in a four way distinction, which I represent as the Square of Disposition. Each cell of this square corresponds to a different type of disposition; I show that each such type is expressed by a distinct linguistic expression. This correspondence between philosophy-based and linguistics-based distinctions shows the potential usefulness of linguistic considerations in philosophical debates.

Keywords: classification of dispositions, capability, *can* passivity, *-able* adjectives, active disposition, *-er* nominals, passive disposition, middles

1 Introduction and Overview

Not all dispositions are the same. Philosophers have considered the nature of dispositions, and introduced many classification of dispositions, based on a variety of dimensions. In this paper, I focus on two dimensions:

1. Whether the bearer of the disposition is an agent/causer or not
2. The modal force of the disposition: universal or existential

Using two dimensions naturally creates a four way distinction: universal dispositions whose bearer is an agent/causer, existential dispositions whose bearer is an agent/causer, universal dispositions whose bearer is not an agent/causer, and existential dispositions whose bearer is not an agent/causer. I will call this classification *The Square of Disposition*.

In this paper, I argue that the Square is expressed linguistically. Specifically, each of the four classes of disposition expressed by the Square corresponds to a linguistic construction.

2 The nature of dispositions

2.1 Dispositions and modality

My starting point is the rather standard assumption that dispositions are modal. In fact, this view is so common, that it is hard to find an explicit statement of it, and in most sources it is simply presupposed. For example, Vetter (2014) writes: “In the contemporary literature on the subject, it is almost unanimously assumed that the modal nature of dispositions is best captured by some kind of conditional” (p. 129). Note that what is almost unanimously assumed is not the modal nature of dispositions, but a particular analysis of it. The modal nature is presupposed, i.e. it is presumably accepted even by those individuals (such as Vetter herself) who dispute the conditional analysis.

It therefore follows that dispositions can only be expressed linguistically by modal expressions. In particular, modal expressions are intensional—they are parametric on possible worlds: being parametric on possible worlds is a necessary (though arguably not sufficient) condition for being modal.

For example, the expressions *The President of the US* and *Barack Obama* have the same extension. However, they have different intensions, as in different possible worlds, the US might have a different president. Modal expressions are sensitive to this distinction: when we substitute one of these expressions for another in a modal statement, the corresponding truth values might differ. For example, while the American Constitution makes (1a) true, (1b) is false; and while (2a) is true, (2b) is false.

- (1) a. The American President was necessarily born in the US.
- b. Barack Obama was necessarily born in the US.

- (2) a. The American President may be a woman.
- b. Barack Obama may be a woman.

It therefore follows that any non-modal expression, however “dispositional” it feels like, cannot express a disposition. This criterion will become very important as we consider the applicability of various expressions as descriptions of dispositions.

2.2 *Active and passive dispositions*

As we consider the nature of dispositions, it behooves us to begin at the beginning. And, just like many other philosophical investigations, the study of dispositions begins with Aristotle.

Aristotle has established what is perhaps the most interesting property of dispositions: that they do not have to be realized. To take the classic example, if this piece of glass is fragile, it means that it is disposed to break if struck. But if it isn’t struck, it probably won’t break; and yet, even if it is never struck and never breaks, it is still fragile.¹

Since Aristotle allows for unrealized disposition, he is faced with the task of explaining when a disposition *is* realized. His answer is that this happens when the right conditions obtain. Specifically: “When the agent and the patient meet in the way appropriate to the disposition in question, the one must act and the other be acted on” (Metaphysics IX 5)

Aristotle’s statement is usually interpreted to imply two types of disposition, *active* and *passive*. And then, dispositions are realized when the bearer of the active disposition and the bearer of the complementary passive disposition meet in an “appropriate” way.

For example, glass has a passive disposition to break if struck, and a hammer has an active disposition to break the glass if it strikes it. If the two meet in an appropriate way—the hammer strikes the glass—the glass breaks. Note that for Aristotle, the realization conditions are fully defined for each disposition: he makes no use of *ceteris paribus* clauses. Therefore, if the conditions are satisfied, the disposition *must* be realized.

2.3 *Capabilities and passivities*

Can we have a type of disposition that doesn’t have to be realized, even if the conditions for it obtain? Thomas Reid (1788) argues that the answer is yes, and calls such dispositions *powers*.

For Reid, an agent has the power to perform an action only if the agent has the power to *choose* to perform the action. It follows that the agent who has the power to perform an action also has the power not to perform the action. Hence, a power doesn’t *have* to be realized, but rather *can* be realized.

¹It is well known that there are exceptions to this property of dispositions—they will be discussed in section 5.

There is another conclusion that follows from Reid’s conception: the agent that has a power must be sentient, with a will and understanding. Reid’s argument is as follows. An agent has a power only if she has the power to exert it; an agent has the power to exert only if she has a will; an agent has a will only if she has an understanding; therefore, an agent has a power only if she has a will and an understanding.

Reid’s powers must involve a sentient agent. However, is it not clear that all dispositions that don’t have to be realized must satisfy this restriction. Indeed, Cartwright (1989) proposes such dispositions, which she calls *capacities*.

For example, aspirin has the capacity to relieve headaches, but this capacity is not always realized. Cartwright writes:

“Aspirins relieve headaches”. This does not say that aspirins always relieve headaches, or always do so if the rest of the world is arranged in a particularly felicitous way, or that they relieve headaches most of the time, or more often than not. Rather it says that. . . on occasion some of them do (p. 3).

Since dispositions are modal, it follows from what Cartwright’s characterization that capacities express possibility rather than necessity: their modal force is existential, not universal.

Clearly, an aspirin is not a sentient agent, so capacities do not require a sentient agent. However, we can note that, nonetheless, the aspirin’s role is not passive—we can say that it has the role of a *causer*. We can therefore conclude that capacities are active dispositions.

Often, a subtype of power is singled out—the powers that relate an agent to an *action*. Such powers are usually called *abilities* (Maier 2014).

We can apply the same distinction with respect to capacities, namely identify the subtype of capacity that relate a causer to an action. Let us call such dispositions *capabilities*. Capabilities, then, are active dispositions with an existential modal force.

Are there also *passive* dispositions with an existential modal force? It would mean that *x* has a disposition to sometimes have a certain property if something acts on *x* in the appropriate way. For example, to say that someone is irritable means they have the disposition to get angry when provoked, but it doesn’t mean they *always* have to get angry if provoked. Let us coin a new term for such dispositions: *passivities*

2.4 The square of disposition

According to the distinctions drawn above, dispositions vary along two dimensions:

1. Whether their argument is a causer;
2. Whether they are always (universal) realized or only sometimes (existential)

We can represent this classification in a table, which I will call *The Square of Disposition*:

	+causer	-causer
existential	capability	passivity
universal	active disposition	passive disposition

3 Linguistic manifestations

The considerations that come into the construction of the Square of Disposition are philosophical; yet, all these dispositions are expressible in natural language. A natural question, then, arises:

how are these types of disposition manifested? Is there a correlation between this classification of dispositions and the classification of linguistic phenomena?

In this paper I argue that, in fact, there is such a correlation: specific types of linguistic construction correspond to specific cells on the Square of Disposition.

4 Passivities and *-able*

Let us begin with the newly coined term of passivities: passive dispositions with an existential modal force.

A natural candidate for the linguistic expression of passivities is the class of adjectives with the suffix *-able* or *-ible* in English: *irritable*, *conceivable*, *washable*, *accessible*, etc.

Clearly, the argument of these adjectives is not a causer, let alone an agent, hence they are appropriate as expressions of passive, rather than active, dispositions.

What about their modal force? First, we must demonstrate that *-able* adjectives are modal to begin with. Consider the following example. Let us suppose there are many databases on some computer server. Some are *accessible*, but others are protected by a password; some are *searchable*, whereas others lack a search engine. Let us further suppose that, in point of fact, ever since the server had been placed online, every database that was accessed, was also searched, and vice versa. So, in this scenario, the property of being accessed and the property of being searched have the same extension. However, it still doesn't follow that a database is accessible iff it is searchable. There might be a database that is accessible, although it has never, in fact, been accessed; but if it *had* been accessed, the user would have found that it is not searchable. Hence, although the properties of being accessed and being searched have the same extension, the properties of being accessible and being searchable do not. Hence, *-able* adjectives are modal, and are therefore appropriate as expressions of dispositions.

The modal force of *-able* adjectives is usually existential; they can, but do not have to, be realized: if something is accessible, it means that it *can* be accessed; if something is searchable, it means that it *can* be searched; if something is conceivable, it means that it *can* be conceived, etc. Indeed, regarding the corresponding suffixes in German, Kratzer (1981) points out: "In general, the suffixes *-lich* and *-bar* express possibility" (p. 40).

It has long been known, however, that there are exceptions to this generalization. Kratzer herself notes a clear exception—*payable*:

- (3) The rent amounts to twenty guilders, payable on the first of January

Kratzer notes: "Here, it is not that the twenty guilders *can* be paid, they definitely *have to* be paid on the first of January" (original emphasis). So, in this case it appears that *-able* can mean (deontic) necessity rather than possibility.

Other exceptions to the generalization that *-able* indicates possibility are not hard to find. If something is edible, it does not mean simply that it can be eaten; rather it means that it can be eaten *safely*; and if something is chewable, it does not mean merely that it can be chewed, but indicates that it is tasty (Fortin 2013).

But are these really exceptions? Fortin (2013) argues that the answer is no. He proposes that the basic sense of *-able* is possibility; all the additional senses are cases of conversational implicature.

One piece of evidence is cancelability—the strengthened sense can be canceled:

- (4) a. Benefits are payable at age 55, but may be deferred at the member's discretion.

- b. A: Is this edible?
B: Yes. It'll put you in hospital, but you can eat it
- c. All vitamins are chewable, it's just that they taste shitty

Sentence (4a) means that benefits *may* be paid, not that they have to be paid; in (4b), B affirms only the possibility sense of *edible*; and (4c) clearly cancels the *tasty* sense of *chewable*, though not its existential modal force.

Another argument involves *reinforceability*: implicature, but not entailment, can be reinforced without the sentence being odd. For example, (5a) is fine, whereas (5b) seems redundant and odd:

- (5) a. Some, but not all of the students came to the lecture.
- b. ?Some of the students came to the lecture, and/but not all of them stayed away.

Now, note that the strengthened meaning of *-able* is reinforceable without oddness:

- (6) a. The invoice is payable no later than 30 days after receipt
- b. It is safely edible
- c. These tasty chewable tablets will make you feel better in no time

Of course, conversational implicature must be *calculable*: it must be shown to follow from Grice's maxims. Fortin (2013) analyzes the implicature of *x is payable by date d* as follows. Its literal meaning is simply "*x* can be paid by date *d*." By scalar implicature, we can conclude that "*x* can't be paid by date $d + 1$ ", "*x* can't be paid by date $d + 2$ ", etc. We therefore get the strengthened meaning, namely "*x* must be paid by date *d*."

The literal meaning of *edible* is simply "can be eaten." But Fortin (2013) points out that almost anything can be eaten. Hence, saying of something that it can be eaten, is really giving very little information. This is a flouting of Quantity; hence, the strengthened meaning is conversationally implicated. A similar explanation is proposed for *chewable*.

We can conclude, then, that *-able* adjectives are modal, their argument is not a causer, and they have an existential modal force. It follows that these are the linguistic expressions that express passivities.

5 Capabilities and dynamic *can*

Recall that capabilities are active dispositions with an existential modal force. I propose that they are expressed by dynamic modals of ability, such as the dynamic *can*:

- (7) John can lift heavy weights.

Note first that dynamic *can* is modal. Suppose everybody who climbed the Everest learned Klingon in two months, and everybody who learned Klingon in two months climbed the Everest. So the properties of climbing the Everest and learning Klingon in two months have the same extension. Yet, clearly, they have different intensions: in different worlds, the set of individuals who climbed the Everest is not equal to the set of individuals who learned Klingon in two weeks. Indeed, dynamic *can* is sensitive to this difference in intensions: (8a) need not have the truth value as (8b).

- (8) a. Sharon can climb the Everest

b. Sharon can learn Klingon in two months

Having satisfied ourselves that dynamic *can* is a modal, let us consider whether it behaves as a disposition. Recall that we have said that dispositions do not have to be manifested; indeed, dynamic *can* seems to fit the bill:

- (9) Our grad students are so tough, they can even eat cardboard, though thankfully it's never come to that (Copley 2005).

However, let us not be too hasty. Sometimes, dynamic *can* does require the occurrence of actual events, as the oddness of (10) indicates.

- (10) #Terence can be really obnoxious, but he has never been obnoxious.

Is this a counterexample to the proposal that dynamic *can* expresses dispositions?

The answer is no. It has, in fact, been argued that some dispositions do require manifestation of actual instances demonstrating them:

Fragility does not require manifestation...bravery is unlikely to be a disposition one possesses but never shows; thoughtfulness and intelligence look impossible; gracefulness and humorousness are impossible (Wright 1991:49).

Dynamic *can* and its synonyms can even have an actual reading, describing a specific manifestation:

- (11) Brown was able to hit three bull's-eyes in a row

Thalberg (1972) evaluates (11) in the following situation: "Before he hit the three bull's-eyes, he fired 600 rounds, without coming close to the bull's-eye; and his subsequent tries were equally wild... Therefore he does not have this sort of ability at target shooting." He concludes: "'Was able' sometimes means 'had the ability' and sometimes means 'did' " (p. 121).

However, it should be pointed out that *was able to* in (11) doesn't mean merely 'did'; the sentence implies that hitting three bull's-eyes in a row is remarkable, difficult, or otherwise unexpected. From this we can conclude that even actual readings of ability modals have a modal flavor: (11) says that the actual world, where Brown hit three bull's-eyes in a row, deviates from what one would expect.

Indeed, such readings pass the test for modality. Suppose everybody who climbed the Everest wore purple socks and a yellow hat, and everybody who wore purple socks and a yellow hat climbed the Everest. So the property of wearing purple socks and a yellow hat and having climbed the Everest have the same extension, though of course different intensions. Now, suppose (12a) is true. This does not make (12b) true, since although climbing the Everest is quite a remarkable accomplishment, wearing purple socks and a yellow hat is not.

- (12) a. Joyce was able to climb the Everest
 b. Joyce was able to wear purple socks and a yellow hat.

An important property of dynamic *can* and its synonyms is that they are subject-oriented. Brennan (1993) proposes that dynamic *can* combines with the VP, resulting in an inherent/essential property predicated of the subject. For example:

- (13) Mary can swim

Sentence (13) does not mean merely that it is possible that Mary will swim; rather, it says that the subject (Mary) has the property of being capable of swimming. One way to see this is to assume that Mary doesn't know how to swim. It is possible that, by chance, she will perform the movements appropriate for swimming; yet (13) is nonetheless false. But if Mary does know how to swim, intends to swim, the conditions are suitable for swimming, and there is no hindrance, it follows from (13) that Mary will, in fact, swim.

Brennan discusses two pieces of evidence for the claim that these modals are subject-oriented. One is the *in virtue of* test. This expression can only attach to dynamic modals, as in (14a) but not, say, epistemic modals, as indicated by the unacceptability of (14b).

- (14) a. Joan can sing arias in virtue of her natural ability.
 b. *In virtue of being a graduate student, Joan may/must be intelligent.

Now, note that *in virtue of* is only fine when it describes properties of the subject, as in (14a), but not the object, as in (15).

- (15) ##In virtue of the rock being lightweight, Mary can lift it.

Note that the problem is not that *in virtue of* cannot describe a property of the subject, because, in general, it can:

- (16) They denied him the prize in virtue of his reputation

Hence, the *in virtue of* test indicates that dynamic *can* is, indeed, subject-oriented.

The second piece of evidence produced by Brennan involves expletives. Brennan notes that, when a sentence contains an epistemic modal, the subject can be replaced by a semantically empty expletive:

- (17) a. Some eggs may be in the refrigerator
 b. There may be some eggs in the refrigerator.

The same holds for deontic modals:

- (18) a. Three lifeguards must be on duty
 b. There must be three lifeguards on duty.

However, this is impossible in the case of dynamic *can*:

- (19) a. Only one demon can be in two places at the same time
 b. *There can be only one demon in two places at the same time.²

It must be admitted, however, that there appear to be counterexamples—sentences where it looks like *can* does not predicate a capability of the subject. For example, (20a) predicates of the subject (John) the capability to lift that big stone; but no capability is predicated of the subject in (20b).

²The sentence is, of course, fine if *can* is taken to indicate circumstantial modality rather than a capability.

- (20) a. John can lift that big stone
 b. That big stone can be lifted by John

Why, then, is (20b) acceptable?

Tao (2011) proposes: “While [(20a)] expresses John’s ability, [(20b)] asserts some objective possibility of John’s lifting that stone” (p. 68). In other words, *can* is reinterpreted as a circumstantial modal.

The following examples probably makes the point more clearly:

- (21) a. John can open this safe
 b. This safe can be opened by John

Suppose John knows nothing about cracking safes; he merely tries codes at random. Of course, there is a possibility that he will guess the right code by chance. In this case, (21a) is false but (21b) is true. The explanation is that whereas the former ascribes to John the capability to open this safe, the latter merely expresses a circumstantial possibility that John will open the safe.

However, treating *can* as subject-oriented is not quite accurate; rather, it applies to the external argument. The external argument is usually the subject, but not always. Unaccusatives are a case in point: their subjects are not external arguments. And, indeed, capability *can* is incompatible with unaccusatives:

- (22) Terry can arrive late.

Sentence (22) can only receive a non-capability interpretation, perhaps a deontic reading (“Terry is permitted to arrive late”).

It should be noted that the external argument is not merely a formal syntactic notion, but is associated with semantic notions of agentivity and causality (Marantz 1984). Therefore, ability modals are good candidates for representing capabilities: existential dispositions that require an agent/causer.

If *can* indicates capabilities, it cannot indicate dispositions that do not relate to actions. We would therefore expect it to be bad, in general, with stative verbs. Indeed, *can* appears to be bad with the stative *know*, compared with the non-stative *speak*:

- (23) a. *Mary can know French
 b. Mary can speak French

It should be noted that Maier (2014) argues that *can* can be used to indicate powers that are not abilities, i.e. that do not have to relate to actions. As an example, he presents (24), and argues that “the power to understand French will be a power, but not an ability.”

- (24) Mary can understand French

Sentence (24) is, indeed, perfectly acceptable; and *understand* is, indeed, normally a stative verb. However, this sentence does not constitute a counterexample, since *understand* can also be used non-statively—for example, it can be used in the progressive (Comrie 1976:36):

- (25) I am understanding French more and more

I argue that sentences like (24) are other cases where *understand* is used non-statively.

6 Universal dispositions and *will*

Dynamic *can* is usually considered together with other dynamic modals, primarily dispositional *will*. Dispositional *will* does, indeed, seem appropriate for the expression of dispositions, since it usually does not require the occurrence of actual events, as indicated by (26a). However, note that, as can be seen by the unacceptability of (26b), sometimes it does.

- (26) a. Our grad students are so tough, they will even eat cardboard, though thankfully it's never come to that (Copley 2005).
 b. #Frank will start crying if left alone, but he has never cried in his life.

As we have seen, a necessary condition for a linguistic construction to express dispositions is modality. Indeed, dispositional *will* satisfies this requirement. Suppose everyone who ate cardboard wore purple socks and yellow hats, and everybody who wore purple socks and yellow hats ate cardboard. Then the two properties would have the same extension; yet (26a) does not entail (27).

- (27) Our grad students will wear purple socks and yellow hats.

The modal force expressed by dispositional *will* is universal: (28) says that under normal conditions, *whenever* sugar is put into water, it dissolves.

- (28) Sugar will dissolve if put into water.

Example (28) is interesting for another reason. Note that the verb *dissolve* is an unaccusative: its subject is not the external argument. Hence, the argument of dispositional *will* may be the external argument (as in, e.g., (26a)), but does not have to be. It follows that dispositional *will* can express both types of universal disposition: active and passive.

A natural question to ask is whether there are expressions that are limited to expressing only active, or only passive, universal dispositions.

7 Passive universal dispositions and middles

I propose that the answer is yes. Specifically, active universal dispositions are expressed by *-er* nominals—to be discussed in the next section—and passive universal dispositions are expressed by the middle construction, to which we will now turn.

First, note that middles are modal. Suppose every book that was read easily was also translated easily, and vice versa. So the properties of being read easily and being translated easily would have the same extension, though different intensions. Now, suppose a new book has just been published, and has not yet been read (or translated). Then (29a) would not entail (29b).

- (29) a. This book reads easily
 b. This book translates easily.

Now note further that middles have a necessity flavor. Sentence (30) implies that, whenever this bread is cut, it is cut easily, not that it is sometimes cut easily, and sometimes with difficulty.³

³Of course, (30) still allows for exceptional cases, e.g. when the bread is frozen solid.

- (30) This bread cuts easily

Indeed, it has been suggested (Condoravdi 1987, Ackema and Schoorlemmer 1994, Lekakou 2005) that middles involve a (quasi) universal modal operator. Middles are therefore appropriate for the expression of universal dispositions.

Lekakou (2005) argues that middles ascribe a dispositional property to the internal, rather than the external argument of the verb. Hence, middles express passive, rather than active universal dispositions.

8 Active universal dispositions and *-er* nominals

-Er nominals are words like *smoker*, *jogger*, *liar*, etc. A necessary condition for them to express dispositions is that they be modal, and indeed they are. Specifically, I will show that they quantify over worlds that maintain essential or inherent properties of the actual world (sometimes called *normal worlds*).

Suppose that, in the actual world, Sally's birthday is December 25th. Unless one believes in astrology, Sally's birthday is not an essential property of Sally: she could have been born on any other day, and still be the same person. Hence, there are possible worlds that preserve essential properties of the actual world, in which Sally's birthday is not on Christmas. We can see that these worlds are considered when an *-er* nominal is evaluated, i.e. they can affect truth conditions.

For suppose Sally drinks on her birthday (and only then). Then (31) would be true; however, (31) would not follow—Sally may not celebrate Christmas, she may not even be aware that her birthday falls on Christmas.

- (31) Sally is a birthday drinker. Sally is a Christmas drinker.

To give another example, suppose all animals except dogs suddenly died in the actual world. But they continue to live in other worlds, which can be as normal as you like. Then (32a) and (32b) would have the same truth value, since all the animals are dogs; however, (33a) can still be true without (33b) being true, since one can be certified to be a dog trainer without being certified to be an animal trainer.

- (32) a. John trains dogs.
b. John trains animals.
- (33) a. John is a dog trainer.
b. John is an animal trainer.

As a final example, consider (34).

- (34) Sally is a smoker

Suppose Sally hates cigarettes, but she is constantly harassed by a militant smoker who forces her to smoke at gunpoint. Consequently, she smokes several cigarettes every day. In this situation, (34) is false.

Now suppose Sally is very fond of cigarettes, but she is confined to a prison where no smoking is allowed, and never leaves it. So Sally doesn't actually smoke, yet (34) is true. Since *-er* nominals are modal, they satisfy the necessary condition for expressing dispositions.

The disposition expressed by *-er* nominals sometimes does and sometimes doesn't have to be manifested. Rappaport-Hovav and Levin (1992) draw a distinction between two types of *-er* nominals: eventive (e.g., *saver of lives*) and non-eventive (e.g., *lifesaver*). In eventive *-er* nominals, the disposition has to be manifested, as exemplified by the unacceptability of (35a); in contrast, in non-eventive *-er* nominals the disposition does not have to be manifested, as exemplified by the acceptability of (35b).

- (35) a. #Cora is a saver of lives, but she has never saved anybody's life.
 b. Cora is a lifesaver, but she has never saved anybody's life.

Both eventive and non-eventive readings of *-er* nominals are dispositional; but *-er* nominals also have non-dispositional readings:

- (36) a. John is a murderer.
 b. I was mesmerized by the singer's voice.
 c. John is a goner.

Sentence (36a) has a dispositional reading: what John does is murder people. However, it also has a non-dispositional reading, the satisfaction of which requires only the existence in the actual world of one event of a murder committed by John. Sentence (36b) can have a dispositional reading, referring to a person whose profession is to sing, but also a non-dispositional reading, referring to a person who was singing at the event time in the actual world. And since the dispositional reading of (36c) is ruled out pragmatically, it only has a non-dispositional reading: there is in the (immediate) future of the actual world an event of John's being gone.

But note that even these non-dispositional expressions are modal, although not dispositional.⁴ Suppose there are exactly three people who murdered someone; and suppose they are about to be executed, and, on their way to the gallows, they are singing. Then, at that moment, the (non-dispositional) properties of being murderers and being singers have the same extension. Yet, although (37a) entails (37b), (38a) does not entail (38b).

- (37) a. Three people who have murdered someone are about to be executed.
 b. Three people who are singing are about to be executed.
- (38) a. Three murderers are about to be executed.
 b. Three singers are about to be executed.

What kind of disposition do *-er* nominals express (under their dispositional readings)? Many researchers (Fabb 1984, Keyser and Roeper 1984, Burzio 1986, Rappaport-Hovav and Levin 1992, van Hout and Roeper 1998) note the External Argument Generalization: *-er* indicates that the argument of the nominal receives the thematic role that the verb assigns to its external argument.

The subject is often the external argument, but not always—unaccusatives are a case in point. Indeed, *-er* nominals normally are not formed from unaccusative verbs:

- (39) *arriver, *faller, *descender, *resembler.

⁴Recall that actual readings of dynamic *can*, as exemplified in (11) and (12) above, behave in the same way.

Schäfer (2010) notes:

The literature sometimes provides examples of *-er* nominals derived from alleged unaccusative verbs. But these examples involve verbs that can be reanalyzed as unergatives in the right contexts. Such contexts typically assign [semantic] control to the only argument of the verb.

Hence, we can conclude that *-er* nominals express active dispositions.

-Er nominals have a universal rather than existential flavor. For example, by Jewish custom, every Jewish baby boy is given a few drops of wine before his circumcision. So, for every Jewish man, in every world (compatible with the custom), there is an event of this man drinking wine. However, this doesn't make him a wine drinker.

One step further is taken by von Stechow and Heim (1999), who identify the universally-flavored quantifier associated with *-er* nominals with the generic quantifier.⁵ They note that, under one reading,

beautiful dancer \approx someone x such that generally if x dances... x does so beautifully

To develop an approach based on this intuition, we need a way of treating *dancer* as involving a stage-level/episodic predicate (which can be the host of the manner predicate *beautiful*) and a generic quantifier.

Hence, we can conclude that *-er* nominals are modal, they require an agent/causer, and have a universal flavor. Hence, they express active universal dispositions.

9 A note on habituals

Habituals are often thought to express dispositions.⁶ Indeed, habituals certainly have a dispositional "feel." And yet, habituals cannot express dispositions, because they are not modal. To be more precise: although habituals are intensional, they are parametric on time, not worlds. That is to say, they are only sensitive to stable properties (properties that hold throughout time) but not essential properties (properties that hold across worlds).

First, let us see that habituals are parametric on time. Let us go back to Sally, whose birthday is December 25th. It is a historical fact that Israeli Prime Minister Menahem Begin and Egyptian President Anwar el-Sadat met on December 25th, 1977. But there were other meetings between Israeli and Egyptian leaders, at other times, before and after that date. Now, if someone were to utter (40a) on 25.12.1977, (40b) would clearly not follow.

- (40) a. Sally drinks on her birthday.
b. Sally drinks when Israeli and Egyptian leaders meet.

However, habituals are not parametric on possible worlds, and, specifically, they are not sensitive to essential properties. Since Sally's birthday is not an essential property of Sally, there are possible worlds that preserve essential properties of the actual world, in which Sally's birthday is not on Christmas. But such worlds are *not* considered when a habitual is evaluated: (41b) *does* follow from (41a).

⁵See also Larson (1998).

⁶See, e.g., Boneh and Doron (2010), Boneh (this volume).

- (41) a. Sally drinks on her birthday.
 b. Sally drinks on Christmas.

To get back to another of our examples, consider (42), and contrast it with (34).

- (42) Sally smokes.

Suppose, as before, that Sally is constantly harassed by a militant smoker who forces her to smoke at gunpoint, and, consequently, she smokes several cigarettes every day. Sentence (42), unlike (34), is true. Now suppose that Sally is very fond of cigarettes, but she is confined to her smoke-free prison. Now, (42) is false.

Since modality is necessary condition for the expression of dispositions, and habituels fail this condition, they cannot be candidates for the expression of dispositions.

10 The Square of Disposition

We can now fill in the square of disposition, for each type of disposition, the linguistic expression that is appropriate for representing it.:

	+Causer	-causer
Existential	capability: <i>can</i>	passivity: <i>-able</i>
Universal	active disposition: <i>-er</i>	passive disposition: middles <i>w i l l</i>

Before concluding, I have a confession to make. In this paper, I first constructed the Square of Disposition, and then tried to fit linguistic expressions into it. However, in the research leading to the paper, I actually worked backwards: I looked at linguistic expressions, and formed the Square so as to fit them in.

What is the significance of this fact? There are many ways to classify dispositions—the Square is only one option. The debate over the correct classification of dispositions will no doubt go on. The debate is, and should remain, a philosophical one, following philosophical considerations.

What I have tried to show is that there is one particular classification that corresponds to what is expressible in natural language. This, of course, doesn't mean that this classification is metaphysically correct. However, what we *can* say is that, to the extent that metaphysical assumptions are expressed by natural language, they are those assumptions which are cognitively important (Bach 1981). It follows that the distinctions between dispositions that are made by natural language, as represented in the Square of Disposition, are those metaphysical distinctions that are cognitively important

I will conclude by echoing the words of Vetter (2014): "I am certainly not advocating that philosophy be replaced by linguistics... but I do take these data to provide some motivation for an alternative approach" (p. 131).

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Dispositions and event nouns: decomposing the agentivity constraint in a light verb construction

Marta Donazzan
Lucia M. Tovena

In this paper, we offer a new argument for introducing dispositions in the analysis of natural language. We present data drawn from light verb constructions in Italian that show the need for a finer-grained characterisation of the properties associated with the Agentive role. These agentive properties relativised to types of events are called *agentive dispositions*. Dispositions can be seen to express a type of potentiality, i.e. a possibility rooted in objects and manifested as properties anchored to individuals. In the context of argument selection, an agentive disposition is a property that holds of the instantiator of the external argument and is understood to be a power for the realisation of the event described by the event predicate of the clause.

Keywords: event nouns, agentivity, dispositions, powers

1 Dispositions, events and event nouns

Dispositions have proved to be a useful notion for describing some linguistic phenomena, one well-known example being that of middle constructions. By saying that a vase is *breakable* or that *The vase breaks easily*, one means that the vase has some dispositions to be broken. Middle constructions of this type appear to be licensed by what may be termed *passive dispositions*: the disposition expressed by *breakable* relates to properties ascribed to an entity and licences for its bearer the role of patient in a breaking event (Lekakou 2004). Such a "passive" view is motivated by the traditional treatment that disposition ascription has received in the philosophical literature. According to the received view, the reasoning underlying disposition ascription is a counterfactual relation between entities and events: if an entity *x* were in an event *y*, then the manifestation *z* would ensue, in case *x* is disposed to *y*-ing. Importantly, the event is triggered by some stimulus condition: a vase is breakable if, *whenever something would act upon the vase with a certain force*, the vase would break.

This way of analysing dispositions is not without problems. On the one hand, some dispositions can be triggered by more than one stimulus condition, and these conditions can be so different that it proves difficult to reduce them to a single case that would fit into the counterfactual conditional antecedent. For example, an irascible man is disposed to get angry easily, which means precisely that there may be a variety of stimuli that can trigger the manifestation of this disposition. On the other hand, some dispositions seem to manifest themselves spontaneously, i.e. without being triggered (at least overtly) by stimuli. As pointed out by Vetter (2010), the very existence of the latter type of dispositional properties, sometimes called *active dispositions*,

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is excluded within the counterfactual model.

A way to overcome these problems is to assume that the characterisation of dispositions need not be related to counterfactual reasoning, but that dispositions express a type of modality which is a species of possibility. According to the view defended recently by Vetter (2010), dispositions can be seen to express a type of *potentiality*. Potentialities are a "local' analogue of possibility" (Vetter 2010:41), which is to say possibilities rooted in objects and manifested as properties anchored to individuals. The departure from the counterfactual model implies that modal properties are accepted in the basic furniture of the world. This is an ontological complication, but it has also some advantages to offer to metaphysics and to the philosophy of science, as extensively argued by Vetter (2010, 2012).

In this paper, we argue that looking at dispositions as modal properties is an approach that can also be of use in describing linguistic phenomena. In particular, it can come in handy in dealing with phenomena related to licensing a thematic role for an entity with respect to a verbal predicate. The contrast between the pairs of sentences in the English and Italian examples in (1) and (6) illustrates the phenomenon we are going to study.

- (1) (2) Yesterday, Mario fell down.
 (3) Ieri Mario è caduto
 (4) The Berlin Wall fell down in 1989.
 (5) Il muro di Berlino è caduto nel 1989
- (6) (7) Yesterday Mario had a (great) fall.
 (8) Ieri Mario ha fatto una (brutta) caduta
 (9) #In 1989, the Berlin Wall had a (great) fall.
 (10) #Nel 1989, il muro di Berlino ha fatto una (brutta) caduta

The sentences in (1) display the unaccusative verb *fall* (in Italian, *cadere*), and differ in the type of entity referred to by the noun phrase in subject position. Sentences (1a,b) have an animate subject, while the subject is inanimate in (1c,d). The difference does not affect the status of the sentences, which are in all cases perfectly acceptable. In the sentences in (6), on the other hand, the verbal predicate is nominalised and is embedded in a complex predication headed by a light-verb, respectively *have* and *fare*, litt. 'do'. Here the animacy difference matters, and sentences (6c,d) with inanimate subjects are unacceptable, whereas (6a,b) are fine.

The difference between the structures in (1) and (6), and the contrast between the subjects in (6a,b) and (6c,d) can be decomposed into a set of issues. A question is whether the contrast can be imputed to properties that the entities participating in the event are expected to exhibit—such as animacy—and, if so, how these properties can be expressed in relation to the verbal predicate. We propose to capture the constraints that lead to the contrast between (6a,b) vs. (6c,d) by considering that the relevant participants' properties express dispositions towards the event described by the predicate.

Looking at the properties of agents and undergoers as dispositions is a way to fill a gap in the modelling of thematic relations. Thematic roles can be seen as the linguistic realisation of the participants' relations in an event, and it is fairly common to assume a two-way conditioning, in the line of Dowty (1991); i) verbs entail for each thematic role a set of relations with respect to their participants, and ii) those entities that satisfy some or all of these entailments are likely

to be mapped to the corresponding thematic role. (Proto-)role entailments are defined with respect to the semantics of verbs and research on verbs has thrived, whereas the requisites of the entities denoted by the nominals realising the verb's arguments are less frequently investigated. We propose to approach the contrast in (6) by talking of dispositions related to thematic roles as a way of telescoping two pieces of information. On the one hand, dispositions are modal properties ascribed to an entity and, on the other hand, these properties are seen as elements in a causal chain. Disposition ascription is a form of conceptual bridging between an entity and a class of events, which, due to the modal essence of dispositions, tells something about the entity but does not carry any existential commitment on the instantiation of the class of events.

The local expression of some requirements on the subject *via* disposition ascription is instrumental in dealing with sentences such as in (6) where the verb is light and the characterisation of the event comes from a nominal (Jespersen 1954). These are instances of complex predication and the entailments that are projected on the external position have multiple origins, in our view. The possible origin of the animacy constraint that both English and Italian sentences exhibit in (6) is discussed by focussing on the case of Italian, because *Ata*¹ nominalisations in Italian provide us with a more transparent case. These nominalisations are morphologically derived from verbs by suffixation with the morpheme *Ata*. Following Tovenà and Donazzan (2015), we argue that this suffix carries the trace of a condition restricting a potential external argument of the verb whose root enters the nominalisation, and contributes specific constraints on the combination of the argument structure of the noun with that of the light-verb. The properties related to the thematic position associated with the external argument are referred to as *agentive dispositions*, and we show that introducing agentive dispositions as a type of potentialities can help us to deal with an issue of argument selection at the syntax-semantic interface.

The paper is organised as follows. In section 2, we will expound in detail the semantics of *Ata* nouns. Our key hypothesis is that *Ata* event nouns enter light verb constructions in order to regain the possibility of being predicated of something. This hypothesis spells out the assumption put forth by Tovenà and Donazzan (2015) that the deverbal *Ata* nominalisation is endowed with a semantic trace of an external argument, i.e. the external argument is at least semantically active, even if syntactically not realisable. As a consequence, the event noun imposes some specific constraints on the realisation of a complex predicate. The first step, in section 2.2, is to review some empirical arguments that strengthen the case for such a semantic trace in the nominalisation. Section 2.3 will then provide a formal definition for the semantics of the suffix. Next, section 3 discusses the proposal according to which dispositions are properties related to thematic roles assigned by predicates, and provides broad empirical support for it. We will start by taking the macro-property of animacy as a first approximation, and consider its relation to typical (proto-)agentive entailments. Our aim is to look more precisely at the way in which the thematic role associated to the subject position should be characterised, and at the properties that should be ascribed to the entity that discharges this role. We will then propose a non-restrictive definition of the Agent role in terms of causal relations, and show that these properties can be expressed as dispositions. Dispositions are put into use in the further compositional step that is taken up more specifically in section 4, where we look at how to put

¹In the following, we will refer to the Italian suffix as *Ata*. We consider *Ata* as one derivational suffix with allomorphs. The capitalised vowel refers therefore to the thematic vowel of the verb, which may vary depending on the declension to which the verb belongs (e.g. *cadere* 'fall' has the form *cadUta*, and *nuotare* 'swim' gives *nuotAta*). Irregular verbs may also have specific forms, cf. *leggere* 'read' → *letta* of example (30) below.

together a verb that is light, has undergone semantic bleaching, at least to a certain extent and only preserves a causative meaning, with an event predicate that is expressed by a nominal. The contrast between (6b) and (6d) calls for a finer characterisation of the agentive role associated with the external argument, one that is relative/sensitive to the type of event described by the nominalisation and of the light verb construction. Agentive dispositions are put at work to relativise causative capacities to types of events. Section 5 concludes the paper.

2 *Ata*-nominals and their contribution in light verb constructions

2.1 *The elective affinity*

There is a clear elective affinity between light verb constructions in Italian and event nouns ending by *Ata*.² This facet of the distribution of *Ata* event nouns has drawn the attention of researchers, mainly with regards to the issue of how the argument structure of these nominalisations is realised in the light verb construction, or, if they do not have one, what is realised in such a construction. This is the concern of syntactic proposals put forth by Samek-Lodovici (2003) and Folli and Harley (2013). They do not address explicitly the issue of why *Ata*-nominals are the specific event nominals used in Italian for this type of construction, and this is a point on which our paper makes a contribution. In our view, the semantic constraint on the external argument present in *Ata*-nominals together with the possibility of overtly expressing such an external argument offered by the light verb construction, are the key for making sense of what looks like an elective affinity of *Ata*-nominals for light verb constructions.

On the one hand, a bias for expressing an external argument seems to be imposed by the derivational suffix itself. The verb that the suffix selects as a base has to be a causative predicate, i.e. it has to encode the potential for expressing an external argument. As we will show, non-dynamic predicates such as stative verbs cannot serve as a base for the derivation process, and predicates that express a change of state of their thematic argument are also generally excluded.

On the other hand, as we have seen in (6b), when the nominalisation is part of a complex predication, more specific constraints on the realisation of the external argument arise. As noted also by Alba-Salas (2004), the nominalisation of *cadere* does not obey to the same constraints when it is used outside the complex predicate, compare the marginality of (6d) with the acceptability of the attested example in (11).³

- (11) La caduta del Muro di Berlino simboleggia l'inizio del processo di unificazione della Germania.
the fall-ATA of the Berlin Wall symbolises the start of Germany unification process

In the remainder of this section, we tackle the question of how to compose the constraints imposed by the nominalised verb (in a way, the output of the nominalisation process) with the selectional requirements of the light verb.

2.2 *Three empirical arguments for an external argument in Ata-nouns*

In this section, we recall three empirical arguments that support the existence of a semantic trace of some agentive requirement within *Ata* nominalisations. Before we present them, we provide some background on *Ata*-nouns in light-v constructions. The two main patterns that

²The reverse is only partly true, because these nominalisations are not restricted to light verb constructions.

³<http://www.berlino.com/muro-di-berlino/>

are realised have been identified by crossing the arity of the base verb with that of the light verb (Samek-Lodovici 1999, 2003). *Ata*-nouns construed on transitive verbs occur with ditransitive light-*v dare* "give" (12), and *Ata*-nouns construed on intransitive verbs occur with transitive light-*v fare* "do" (13).

- (12) Mario ha dato una mescolata al minestrone. transitive V-base
Mario gave a stir to the soup
- (13) Gianni ha fatto una camminata. intransitive V-base
Gianni had a walk

In some cases, both light verbs are possible with the same nominalisation, cf. the case of *lavata* 'wash' in (14). The transitivity distinction surfaces via the referentiality of the complement noun. When the patient is expressed by an indefinite nominal, the light verb is *fare*, as in (14a). When it is definite, the light verb is *dare*, see (14b).

- (14) (15) Gianni ha fatto una lavata di lenzuola. indefinite NP
Gianni made a washing of sheets
- (16) Gianni ha dato una lavata alle lenzuola. definite NP
Gianni gave a washing to the sheets

For the purposes of this paper we will not discuss in detail the issue of the internal argument and its relation to the choice of the light-*v*. We leave aside the specifics of the alternance in (12)–(13) by assuming that the nominalisation—directly or indirectly, e.g. *via* a ApplicativeP as per Folli and Harley (2013)—is always the complement of this little *v* projection.⁴

2.2.1 Coincidence of subjects The first piece of evidence comes from facts holding in several languages. In *Ata* complex predications, the subject of the light verb is obligatorily coreferential with one of the arguments of the event noun. An analogous constraint was observed to hold for English light verb constructions by Wierzbicka (1982) in her descriptive study. This requirement is captured by a transfer style approach such as the one proposed by Samek-Lodovici (2003). Sentence (17b) is judged ungrammatical, contrary to (17a) where *fare* is a full verb.

- (17) (18) Mario ha fatto la firma di Paolo.
Mario made Paolo's signature
- (19) #Mario ha fatto la nuotata di Paolo.
Mario had the swim-ATA of Paolo

⁴Note, however, that if the applicative integrates the complement in the syntactic representation, no aspectual effect is expected. Where is the constraint against patients that measure out the event? Folli and Harley posit a constraint against definiteness as part of the diagnostic of light verb *dare* with creation verbs. The subject of the small clause would involve a presupposition of existence, incompatible with a non-existent item. This line of reasoning does not cover contrasts such as (i) vs. (ii), where the base verb is transitive and is not a verb of creation, the light verb is *fare* and the internal argument cannot be definite.

(i) Luisa ha fatto una mangiata di funghi.

Luisa had a treat of mushrooms

(ii) *Luisa ha fatto una mangiata dei funghi.

Luisa had a treat of-the mushroom

Further evidence pointing in the same direction comes from sentences containing relational adjectives. These forms potentially can express one of the arguments, but they never do so, cf. (20).

- (20) (21) Mario ha fatto una chiacchierata paterna con Gianni.
Mario had a paternal chat with Gianni.
- (22) Ho colto con grande simpatia la chiacchierata paterna che il nostro Papa ha fatto con i preti di Albano a Castel Gandolfo qualche giorno fa.
I received with great sympathy the paternal chat that our Pope had with the priests of Albano in Castel Gandolfo, a few days ago.
(<http://www.uncommondescent.com/documentation/ID-in-Italy.pdf>)

Coreference with the argument of the relational adjective is never available in (20), and the adjectives are interpreted intensionally as referring to a kind. Mario doesn't need to be the father of Gianni for the sentence (20a) to be true, as (20b) further shows.

2.2.2 Restrictions on the aspectual classes The second piece of evidence is more specific to Italian and concerns the aspectual class of the verbs whose roots can enter the nominalisation, as noted by Gaeta (2002) and Tovenà (2014), and contra Folli and Harley (2013). Non-dynamic predicates such as states (23) and inchoative states (24), are excluded. Dynamic telic punctual predicates such as achievements (25) are equally excluded, unless they undergo a form of coercion. Examples such as (28) illustrate the fact that accomplishments are also banned.

- (23) Mario conosce il francese/ *ha fatto una conosciuta di francese.
Mario knows French
- (24) Mario si è ammalato/ *ha fatto un'ammalata.
Mario got sick
- (25) (26) Mario ha vinto la gara/ *ha fatto una vinta della gara.
Mario won the race
- (27) Il vaso si è spaccato/* ha fatto una spaccata.
The vase broke
- (28) Mario ha mangiato la torta /*ha fatto una mangiata della torta.
Mario ate the cake

In other words, *Ata*-nominalisations consistently denote events of the activity type. This aspectual restriction can be stated also in the following terms: *Ata* nouns select for predicates whose only argument is the external one. These predicates, moreover, denote dynamic events, which are known to be characterised by agentive arguments (Dowty 1979). Building on these two empirical observations, we suggest the following conclusion: the individual that discharges the agentive role in the argument structure of the nominalised verb is the only participant of the event denoted by *Ata*-noun that may act as a particular for identifying the event. This speculation is not unmotivated. To say that an event is identified by the individual who is causally responsible for it, can be seen as a way of spelling out the assumption that causes identify events (Davidson 1969).

2.2.3 *Nomina vicis* The third empirical argument in favour of the presence of a condition for the potential realisation of an external argument has also to do with the role of the external argument in identifying the event, and concerns the specific reading of these event nouns. Its cross-linguistics implications are an independent research project on its own and we will not be able to do them justice here.

Deverbal *Ata*-nominals are nominals that can refer to specific occurrences of events, not to types of events (Gaeta 2000, 2002, Tovina and Donazzan 2015, Donazzan and Tovina to appear). It has been proposed to characterise this reading with the notion of *nomen vicis*. The forms that support it might not be specialised for it, and surely do not seem to have a unique morphological makeup across languages. A characterisation of *Ata*-nominals in Italian that extends to *nomina vicis* is provided by Gaeta (2000, 2002), who observes that *Ata*-nouns do not support generic readings (29).

- (29) Il nuoto/# la nuotata in piscina non è più di moda.
Swimming/the swim-*ata* in the pool has gone out of fashion

Note that other forms of derived nouns in Italian are not subject to this constraint, cf. (30). This behaviour is specific to *ata* nominalisations.

- (30) Leggere/la lettura/*la letta è un'attività solitaria.
Read-INF/ the read-URA/ the read-ATA is a private activity

Gaeta's observation is formulated in negative terms, as a distributional restriction, but is motivated by invoking a morphological reason. Genericity, says Gaeta, is blocked because the domain of denotation of these nouns is discretised by perfective aspect and the single units cannot be used to refer to the process.

We agree with Gaeta's idea of taking into consideration aspectual information, and we integrate elements from the morphological derivation with syntactic-semantic considerations. The suffix can be derived from that of inflexional past participial morphology and is subject to the same morpho-phonological adjustments (Ippolito 1999), but aspect cannot be the only ingredient. On the one hand, perfective aspect does not block reference *per se*, and on the other hand, past participle formation in Italian is not sensitive to aspectual classes in the way we see for *Ata*-nominals (Tovina 2014), cf. (23)–(28) in section 2.2.2.

The resistance to generic readings is taken to be a side-effect of the constraints on event identification. The external argument of the base predicate cannot be given an arbitrary referent, but has to be realised by a particular individual.

2.3 *The external argument in the suffix*

We have seen that there are empirical reasons for assuming that *Ata*-nominalisations contain a semantic trace motivating the realisation of the external argument as the subject of a light-verb in complex predicates. Aspectual considerations related to the perfective component in the original inflexional suffix have motivated Tovina (2014) to propose that the present days *-Ata* ending has specialised into a derivational suffix. Tovina and Donazzan (2015) have added a constraint to its content, stating that the events in the denotation of *nomina vicis* are associated with an initiator. This is a semantic restriction that applies to the external argument although this argument is not syntactically realised. The entry of the suffix is provided in (31).

$$(31) \quad \lambda R \lambda e [R(e) \ \& \ \text{INITIATOR}(e)=x \ \& \ \text{DELIMIT}(e)]$$

The derivational suffix takes as input a Root, contributes a Davidsonian argument and the property of delimitedness of the event, and associates it to an individual *via* the role of initiator. The event is associated with an initiator by a function that takes the event variable as its argument and returns an individual that is assigned as a value to variable *x*. This variable *x* is not bound by a lambda operator, because the nominalisation does not have a syntactically realised external subject. The function INITIATOR works as a semantically active constraint with no syntactic expression when the nominalisation is used in isolation. The end result is that whenever the Davidsonian variable gets instantiated, the event is associated with a particular initiator. This undefeasible and specific association between event and initiator right from the beginning is at the base of the *nomen vicis* reading. As we see, the requirement of an initiator is introduced by the suffix and, as its immediate consequence, it makes it work as a filter for the candidate roots. The requirement captures the empirical generalisation that only activity verbs seem to be allowed as bases for these nominalisations illustrated by the facts in (23)–(28)⁵ and accounts for the specificity of *nomina vicis*, because the external argument discharges the Agent role and is the participant that individuates the event denoted by activity predicates.

The function DELIMIT has been developed by Tovenà (2015), according to whom the suffix works like an event modifier that measures the event using contextual information, see (32).

$$(32) \quad \lambda P \lambda e [P(e) \ \wedge \ \mu(\tau(e)) = d \ \wedge \ d \geq \text{Min}(\mu(\tau(e)))]$$

The measure function for times μ in (32) is a variable over measure functions such as hours or minutes. The perfective content is captured by applying the contextually determined function μ to the temporal trace of the event $\tau(e)$ and assigning its value to a variable *d*. The predicate of events *P* is instantiated by the verb base and restricted to denoting in a homogeneous domain. $\text{Min}(\mu(\tau(e)))$ is the minimal duration of an event of type *P*, and the value of *d* is superior or equal to it.

In this paper, we adopt the idea of a nominalisation obtained with the apport of a suffix derived from inflexional past participial morphology, and integrate it with Tovenà's (2015) aspectual restriction and with Tovenà and Donazzan's (2015) initiator condition.⁶ Taken all together, this results in the characterisation of the suffix given in (33).

$$(33) \quad \lambda R \lambda e [R(e) \ \wedge \ \text{INITIATOR}(e)=x \ \wedge \ \mu(\tau(e))=d \ \wedge \ d \geq \text{Min}(\mu(\tau(e)))]$$

The next step is to determine how the constraint of the external argument in (33) can be integrated in a compositional analysis of the complex predicate. Previous analyses have not considered this issue, but have tackled the more general issue of the arguments of the light verb construction. We will treat the composition in detail in section 4. Before that, we devote section 3 to the discussion of the Agent role of the causative verb, and the properties required by the entity that discharges this role.

3 Agentivity and dispositions

As we have pointed out in the previous section, there are reasons to assume that *Ata*-nominalisations are associated with the external part of an argument structure, at least of a conceptual

⁵See Folli and Harley (2013) for a different view on the presence of aspectual constraints.

⁶There is a nominalising head that determines the category of the output as a noun ending by *a*, but this is not crucial for the point we are making here.

argument structure. There is a long trend of analysis in the literature about the role of participants in an event, and various notions and terms have been proposed.⁷ Several theories of argument selection can be seen ultimately as attempts to solve the problem of terminological proliferation, by reducing thematic relations to cluster concepts, such as "proto-roles" (Dowty 1991) or "macro-roles" (Van Valin 2005). An important point for our argument is that the entailments associated with thematic positions determine the attribution of specific properties to the entity filling the relevant thematic role. In the following sections, we will try to "bridge the gap", so to speak, between the verbal entailments that characterise the thematic role of Agent and the properties of the entities that are allowed to fit into this role.

3.1 More data illustrating the agent (proto)type

Let us look more closely at the properties of the entity associated with the Agent role by considering, as a start, the broad categorial property of *animacy*. The contrast with respect to animacy is brought up, in our case, by unaccusative verbs. Unaccusativity, in its semantic interpretation, is the label traditionally used to refer to an intransitive verb whose syntactic argument in subject position does not discharge a semantic role of agent. Some verbs traditionally classified as unaccusative in Italian allow *Ata*-nominalisation, see (34)–(37).⁸

- (34) (35) Mario è/*ha caduto giù per venti metri.
Mario fell twnty meres down
- (36) Mario ha fatto una (brutta) caduta.
Mario had a (bad) fall
- (37) (38) Mario è/??ha scivolato giù per venti metri.
Mario slided twenty metres down
- (39) Mario ha fatto una scivolata di venti metri giù per il pendío.
Mario slided twenty metres down the slope

Unaccusative verbs can have a subject that is human (40a, 46a) or non-human (43a, 49a). but the distinction that is relevant for our argument is that when the nominalised verb is inserted in a complex predication, non-human subjects are not acceptable anymore (43b, 49b).⁹

- (40) (41) Mario è caduto dalla sedia.
Mario fell from the chair

⁷For instance, 'deep semantic cases' (Fillmore 1968) and 'thematic relations' (Jackendoff 1972), to name just two milestone references in the semantic production on the topic.

⁸Here we take auxiliary selection as *prima facie* evidence for unaccusativity. It is fairly common to assume, starting from Burzio (1986), that unaccusative verbs select for the auxiliary *to be* in Italian, while unergative verbs select for *have*. It has also become clear however that the auxiliary selection criterion identifies not only two core classes of unaccusative and unergative verbs but also more peripheral ones, where it is possible to observe variation and context effects within one and the same language.

⁹A similar observation has been made by Wierzbicka (1982) with respect to the verb *fall* in the English light-verb construction *have a fall*, cf. (Wierzbicka 1982:796):

Thus Humpty Dumpty could *have a great fall from the wall*, but an apple could not *have a fall* from a tree or a book from a bookshelf.

Wierzbicka (1982) explains the contrast by evoking, for the *have a fall* construction, a potential experience of the agent, an intuition that only partially matches our analysis.

- (42) Mario ha fatto una (brutta) caduta.
Mario had a (bad) fall
- (43) (44) Il libro è caduto dalla sedia.
The book fell from the chair
- (45) #Il libro ha fatto una brutta caduta.
(the book had a (bad) fall)
- (46) (47) Mario è entrato nella stanza.
Mario entered the room
- (48) Mario ha fatto un'entrata (trionfale).
Mario made a (triumphal) entering
- (49) (50) La luce è/*ha entrata nella stanza.
The light entered the room
- (51) #La luce ha fatto un'entrata (trionfale).
The light made a (triumphal) entering

Animacy is a categorial property, that is, a property that is attributed to entities independently from their relation to an event. Animacy however is often related to more specific proto-agent entailments (Dowty 1991). One of these is *volitionality*. It may be argued that volitional agents are necessarily animate, and thus, if being animate does not entail to act volitionally, the converse must be true. However, to characterise the role of the agent by volitionality is also problematic. On the one hand, typically non-volitional ergative verbs are found in nominalised form, e.g. *sudare* "to sweat" (52).

- (52) (53) Mario *è/ha sudato.
Mario sweated
- (54) Mario ha fatto una sudata.
Mario had a sweat

Recall that predicates describing non-volitional events such as *bleed* and *perspire/sweat* posed noticeable problems to philosophers of action. It is a debated issue whether non-volitional bodily movements should be described as actions or as things that merely happen to their subjects. Thalberg (1972) discusses the problem in some length, and argues that "these episodes are not things that happen to a person" (because) "if you perspire, it is a contingent matter that anything acts upon you to make you perspire" (p. 19). In other words, perspiring and bleeding, when predicated of a person, are non-volitional, but are still actions that depend primarily on their subject to be brought about.¹⁰

¹⁰More precisely, Thalberg (1972) considers predicates such as *chocke* and *cough* to be of a potentially separate group that describe "reactions" to stimuli, and therefore non-voluntary *acts* of a subject. Likewise, *sleep* is termed a "breakdown" verb, which implies a lack of control and awareness, but which describes again an action. The problem, here again, arises when one considers control and volition the crucial notions for teasing apart actors from undergoers. de Lancey notes that categorisation is ultimately language dependent. For example, a predicate like *sneeze* takes a subject-form argument in Lakhota but an object-form argument in Lhasa Tibetan (de Lancey 1990). The variation can be explained, he suggests, precisely because of the different perspectives which one might take with respect to these events - viewing it as an internally caused event, or as an external accident.

On the other hand, volitionality can be seen as a weaker pragmatic enrichment (Holisky 1987, Van Valin and Wilkins 1996), since it can be suspended in most cases with no consequences on grammaticality.

- (55) (56) Mario ha sudato senza volerlo.
Mario sweated without intending to do so
- (57) Mario è caduto senza farlo apposta.
Mario fell without doing it on purpose
- (58) (59) Mario ha fatto una sudata senza volerlo.
Mario had a sweating without intending to do so
- (60) Senza volerlo, Mario ha fatto una brutta caduta.
Involuntarily, Mario had a bad fall.

Finally, note that, when the nominalised non-volitional predicate enters a light-verb construction, the contrast surfaces once again in terms of animacy, but volition then cannot be at the origin of the contrast.

- (61) (62) Mario sta sudando.
Mario is sweating
- (63) Mario sta facendo una sudata.
Mario is having a sweating
- (64) (65) Il salame sta sudando in questa fase di stagionatura.
The salami is sweating in this phase of the curing
- (66) *? Il salame sta facendo una sudata in questa fase di stagionatura.
The salami is having a sweating in this phase of the curing

The notion of *control* has also been frequently evoked to explain proto-agent entailments. Contrary to volitionality, the possibility to control an action or a process is not related to animacy by entailment. Complex systems and automata can be understood as controlling a given process. In particular, a form of control could explain the difference between the examples in (67) and (70). One can argue that it is easier to attribute the possibility of controlling its own movement to a self-propelling engine like a motorbike, irrespective of animacy and volition.¹¹

- (67) (68) La moto è scivolata/?ha scivolato.
The motorbike slid
- (69) ?La moto ha fatto una scivolata.
the motorbike had a slide
- (70) (71) La bici è scivolata/#ha scivolato.
The bike slid

¹¹The acceptability of (67) may at first sight seem marginal, but a quick Google search confirmed our intuition. The ergative pattern in the (a) examples *X ha scivolato* had the contrasting scores of 240 hits for the motorbike vs. none at all for *la bici ha scivolato*. In the complex constructions (b) (*X ha fatto una scivolata*), the motorbike totalised 8 examples vs. none at all for the bike.

- (72) #La bici ha fatto una scivolata.
the motorbike had a slide

Control, however, is an entailment of the verb, that is, it cannot be considered as a property that can be ascribed to an entity independently, unlike animacy. The very same *Daniel* is in control in (73a) and is not in (73b).

- (73) (74) Daniele mi ha promesso di venire.
Daniel promised me he will come
(75) Daniele conosce la risposta.
Daniel knows the answer

Summing up, it looks as if there can be no common ground in the examples we looked at so far. The property of animacy is not compelling for the subject, since agentivity clines can be observed between non-animate entities, and it does not imply volition or control. Control can explain the contrast between (67) and (70), but cannot be at the origin of the difference between (61) and (64). In other words, the quick survey of the examples proposed in this section makes the point for trying to solve the notorious problem of linking theories, namely the fact that the broad inventory of possible thematic roles often assumed in decompositional approaches, and the even larger number of semantic features associated with these, are sometimes not sharp enough to capture the selectional restrictions of verbs within one and the same language. In the following section, we propose a non-restrictive definition of the Agent role, capable of encompassing the inventory of features evoked to describe the cases discussed here.

3.2 *The Agent role*

As noted by de Lancey (1990), the semantic category of Agent must be understood as intensional. Agent is a relation that can be predicated only of particular entities with respect to particular events. It makes sense then to ground the definition of agentivity first and foremost in the structure of an event type. The view that we will adopt here is that dynamic events can be represented essentially by causal chains, and that thematic positions can be defined in terms of causal relations. The role of agent is then related to causal responsibility and to the status of first link of the chain.

Cognitive semantics considers causation as the principle that underlies the fundamental sense of agentivity, since the different properties of agents can be reduced to their role as immediate or mediate causers in a causal chain (de Lancey 1984, Croft 1998). The conceptualisation of events as causal chains is supported by several studies in cognitive psychology, where a connection has been established also with respect to linguistic expressions. It has been noted that the perception of events as wholes or as composite entities parallels the linguistic expressions (e.g. periphrastic or lexicalized causatives) used to describe them (Wolff 2003).

Building on this background, we propose that the main entailment that is relevant for agentivity is a causative entailment, which could be expressed in a decompositional analysis by imposing a feature CAUSE on the Agent role. This role thus represents the causal responsibility of the subject with respect to the event denoted by the verbal predicate. Being causally responsible for an event means, in practice, to be "the first identifiable cause of the event" (de Lancey 1990:p. 7).¹² In terms of entailments, then, this approach implies a less restrictive notion of agentivity

¹²Cf. also Primus (1999) and Schlesinger (2013), for alternative accounts of the role of causation, as a prominent

than generally assumed in the literature, where neither animacy nor volition are necessarily part of the definition.

The non restrictive definition that we adopt allows for cross-linguistic variation in the choice of which properties are relevant for expressing causal responsibility with respect to which predicates. Some languages may be more restrictive, imposing a morphosyntactic or semantic feature of animacy or volition for a certain predicate, and other less. Cross-linguistic variation however will not be our concern here, since our aim is to build a more general frame for analysing the interaction of the Agent role feature with the properties displayed by the event participants.

3.3 *Agent-related properties as dispositions*

The Agent role is identified with the first link of the causal chain that defines an event type. But then, we may ask what legitimates the assignment of the Agent role to a particular entity in the causal chain, and which properties an entity has to possess in order to be causally responsible of a particular event.

There may be different approaches to an answer. One is to look at the set of entailments of a particular predicate, and indirectly define the properties that a possible agent may have. Another way is to move from entailments with respect to a position to the properties that entities have in more abstract causal chains. Agentive properties then would be the link between two independent perspectives—that of the verb with that of the event represented by the causal chain. A verb has roles, an event has participants. We are interested in the properties of event participants, and then we wish to link them to the entailments of the verb. Invoking dispositions enables us to bridge these two domains, and we are going to take dispositions as properties viewed as relevant for events.

Let's take stock. We introduced the contrast between the pairs of sentences in (1) and (6) as an illustration of a linguistic phenomenon that calls for an approach based on dispositions, and we also argued that, in order to describe this agentive component, we need to depart from the view on dispositions as conditional statements about entities that was mentioned in the introduction. This is because, in our view, dispositions express a form of potentiality. To be more precise, dispositions are properties that "bestow a causal power upon their bearers" (Ellis 2002).¹³ A more precise definition of causal power is provided by Ellis (2012): 'Any quantitative property P that disposes its bearer S in certain circumstances C_0 to participate in a physical causal process, which has the effect $E - E_0$ in the circumstances C_0 , where E is the actual outcome and E_0 is what the outcome would have been if P had not been operating.' As noted by Ford (2012), this description "outlines two criteria for being a causal power: It must dispose its bearers to be involved in causal processes that i) involve transfer of energy; and ii) would thereby make a difference in outcome so long as the circumstances remain constant" (p. 190). We contend that entities that can discharge the Agent role must be characterised by active causal powers, acting in causal processes by impressing energy and by determining, by their action,

entailment or semantic feature.

¹³Traditionally, both dispositional and categorical properties have been put forward in attempts to describe the manifest world. Categorical and dispositional properties have been opposed in philosophy with respect to their role in causation, and the debate is whether all or only some of the fundamental properties have dispositional essences. Ellis (2012) contends that there is an ontological difference between dispositional properties and categorical properties, that is, properties that do not have dispositional essences. The debate should not concern us directly here, since we will focus on dispositional properties as related to causation and triggered by specific events.

the outcome.

Assuming the association of a causal process to an event-type, we argue that dispositions are those potentialities that attribute to their bearer the power to be an element of the causal chain leading to a class of events.

- (76) disposition = a property that has the status of a power with respect to a manifestation, and more generally with respect to a characterisation of events, making its bearer an element in the causal chain leading to this characterisation of events.

In less abstract terms, and linking causal powers to linguistic realisation, we suggest that "active" and "passive" powers respectively mean the licensing of the role of Agent or Undergoer with respect to a verbal predicate. It is precisely when taken in a causal relation that dispositions can be "passive" or "active". In this paper we are discussing in particular the case of "active" dispositions that we call *agentive dispositions*. The general definition in (76) is refined as in (77) for the specific case of agentive dispositions.

- (77) agentive disposition = a property that has the status of a causal power with respect to a manifestation, and more generally with respect to a characterisation of events, making its bearer the first element in the causal chain leading to events under this characterisation.

It is the link between the property and the manifestation that gives to the property the status of a power, and, in the case of agentive dispositions, this power is a causative power: the bearer of the disposition has the potential to be the causer of the event.

3.4 Agentive dispositions in language

Let's see now how this characterisation of agentive dispositions can be useful if applied to concrete examples. Take the case of (61) vs. (64), repeated below as (78) and (81).

- (78) (79) Mario sta sudando.
Mario is sweating
- (80) Mario sta facendo una sudata.
Mario is having a sweating
- (81) (82) Il salame sta sudando in questa fase di stagionatura.
The salami is sweating in this phase of the curing
- (83) *? Il salame sta facendo una sudata in questa fase di stagionatura.
The salami is having a sweating in this phase of the curing

It should be clear that the characterisation that we are pursuing is not concerned with the actual manifestation of the event, nor are we claiming that dispositions are to any extent a way to define thematic roles. Rather, the question we have been addressing is that of finding a way to express the difference between two potential subjects of the verb *sweat* in Italian, given the requirement imposed by the thematic role of the verb. The answer must clarify why it is the case that both Mario and the salami can be the subject of *sweat*, but only Mario can be mapped to the external argument position of the light verb in the complex causative construction.

The line we are exploring is that an agentive dispositional subject of sweating is viewed as having some properties that give him the disposition of sweating, i.e. that enable him to be causally responsible of an event of sweating that realises his disposition, as stated in (84).

- (84) Mario has an agentive disposition wrt to [sweat] = Mario possesses the property that is considered a causal power wrt events of sweating

From the data we have examined, it has turned out that the agentive dispositions that are relevant in light verb constructions are not necessarily so for the roots in *Ata* nominalisations. In other words, the causative light verb in (81) selects for its external argument a causative feature that has to be checked by an entity with specific causal powers, which are possessed by Mario but not by the salami.

We have seen that invoking volitionality or control is not really useful for expressing this causative feature in the light verb construction, since no such constraints are found on the Agent of the light verb. The contrast recalled in (78) and (81) is suggestive of an animacy opposition. We have seen, however, that reading the data in this way is also not an optimal solution, for at least two reasons. First, on an empirical ground, animacy alone cannot explain the contrasts in acceptability that we observed for *Ata*-nouns in section 3.1, see in particular (67) and (70). Second, and more importantly, animacy is a categorial property, which is ascribed to an individual independently from its relation to an event.

We manage to defuse both issues by saying that animacy is not relevant *per se*, but it becomes relevant in relation to causal responsibility. In a sense, animacy bestows some causal powers on its bearer. Mario has a causal power with respect to sweating in (78b) in virtue of his being an entity self-organised for sweating, and therefore being the primary cause of an event of that type that has him as an experiencer participant. Similarly, a motorbike is a self propelling entity and a bicycle is not. The fact of being an entity with (respectively without) this property, makes it an entity with (without) the power to be causally responsible of a motion event, and the contrast between (67) and (70) is expected.

In sum, assuming that entities have properties, what we call requalifying a particular property as a disposition is precisely the move of characterising such a property relatively to its causal powers with respect to an event type. In the next section, we analyse light verb constructions with *Ata* nominals as constructions that require this type of requalification.

4 Integrating semantics and syntax

4.1 A hybrid predicate

The view of dispositions as characterisations of properties relativised to the causal power they can have with respect to an event type, has something to offer to a theory of argument selection. For one thing, it opens the possibility to appeal to the notion of agentive dispositions in order to account for the contrasts between (67) and (70), repeated here as (85) and (86), abstracting away from the problematic notion of animacy and from specific entailments such as volition or control.

- (85) ?La moto ha fatto una scivolata.
the motorbike had a slide
- (86) #La bici ha fatto una scivolata.
the bike had a slide

As pointed out above, the contrast is explained in our account by the fact that an engine—as a motorbike—has the power to be causally responsible of a motion event, whereas a bicycle cannot be easily seen as self-moving or self propelling. Property requalification brings with it some specific assumptions with respect to the structure of the light verb construction. The motorbike in (85) is the subject of a causative light verb, yet it is licensed for this function in virtue of its disposition to be causally responsible of an event of a specific type, namely a motion event. However, the characterisation of the event type is provided by the nominalised verb, not by causative *fare*.¹⁴ Moreover, the nominalisation is not alone in characterising the event. As said, the causative light verb imposes a constraint on this external argument position that is stronger than the one imposed by the nominalisation. In other words, the event of sliding (*scivolare*) is an event of change of place when the root is realised as a verb, but when it is described *via* an *Ata* nominalisation (i.e. as *scivolata*) embedded in the light verb construction, the entity that undergoes the change of location must also be actively implicated in the event. The task is therefore to explain how these components combine to yield the strengthened requirement on the external argument.

The issue of the embedding of *Ata*-nominalisations in light verb constructions has been tackled by previous analyses in different ways. Samek-Lodovici (2003) has proposed that the complex predicate has a unique argumental structure inherited from the base verb, *via* a system of transfer and suppression of thematic indices. His proposal cannot predict contrasts such as (78) and (81), nor that between (85) and (86). Indeed, the contrast between (86) and (87) shows that the causative light verb does contribute a specific constraint, and that the thematic role of its external argument cannot simply result from a transfer from the argument structure of the nominalised verb.

- (87) La bici è scivolata.
The bike slid down

Folli and Harley (2013) have taken the opposite route and dealt with the argumental structure of the two predicates independently. More specifically, they claim that the external argument of the light verb is not transferred from the nominalised verb, rather ‘the complex predicates formed with both *fare* and *dare* are agentive, and both these light verbs select an external argument of their own’ (p. 102). The nominalisation does not select arguments. Their proposal too does not make the right predictions. The causative entailment imposed by the light verb turns out to be relevant relatively to the specific event denoted by the nominalisation, not in general terms, as it could be expected if the constraint were projected independently by the light verb alone, see again the contrast between (85) and (86). More generally, the assumption of a constraint independently projected goes against the idea that we try to spell out here, namely that the nominalising suffix itself contributes a piece of information concerning the realisation of the external argument.

Our approach is justified in the light of clear empirical data, and, we claim, is sound from a theoretical point of view. *Ata*-nominalisations in light verb constructions are nominal predicates that denote in the event domain, i.e. their type is $\langle \varepsilon, t \rangle$ and not $\langle e, t \rangle$, where ε is the type of events. One implication of our analysis is that information concerning the structure of the event denoted by the nominalised verb, and of its conceptual argument structure, must still be

¹⁴Recall that this remark and the content of the whole section apply to the light verb construction with *dare* too.

accessible at the level of the composition between nominalisation and light verb. This means that the nominalisation, when it is complement of *fare*, is not by itself a closed interpretive phase. If we assume that the interpretive phase closes off at the DP level¹⁵, the event noun should not be analysed as a DP but as a property. It is interesting to note that the nominalisation can hardly be a definite or quantified over, when it is complement of a light verb, see (88).

- (88) Gianni oggi ha fatto *la scivolata/*tutte le scivolate/*ogni scivolata.
Gianni today has made THE slide-ATA/ all the slide-ATA.PL/ each slide-ATA

But in other syntactic contexts, it is possible for *Ata*-nouns to be complement of determiners. In such cases, the DP can be used independently as argument of a lexical verb or a preposition, and can be quantified over (89), albeit with some restrictions coming from the interpretation of the external argument.¹⁶

- (89) L'allenatore ha trattenuto il respiro ad ogni scivolata/a tutte le scivolate/durante la scivolata del pattinatore.
The trainer has held the breath at every slip/ at all the slips/ during the slip of the skater
The trainer held his breath every time/when the skater slipped

Thus, the light verb construction is a somewhat hybrid structure. On the one hand, contrasts such as (85) and (86) show that the thematic role associated to the external argument position of the light verb *fare* is determined also by entailments projected by the nominalised verb. The dispositions that legitimate the denotatum of the subject DP as Agent in (85), and not in (86), are defined with respect to a verb of motion. On the other hand, the light verb *fare*, which has become semantically bleached and acts as a purely functional head, still contributes the semantics of a causative verb. This contribution determines a strengthening of the causative entailment for the thematic role associated with the subject position of the complex predicate, cf. (86) vs. (87).

The causative entailment is an essential piece of information for the saturation of the subject position. In order to be causally responsible of the event denoted by the nominalised verb, the entity that discharges the role of Agent must possess at least a property that can be requalified as an agentive disposition for the type of event. In the next section, we will propose a way to build this hybrid structure.

4.2 Building the predicate

The task of the light verb is understood as to bring the event denoted by the nominal—with its properties—into the main predication. Tovenà and Donazzan (2015) have proposed that the nominalisation that occurs in a light verb construction merges with the head *v* via the special rule in (90), and we adopt this analysis.

- (90) Event Identification with Role Composition

If *Z* is a binary branching structure with daughters *X* and *Y*, and *X* is of type $\langle e, \langle \varepsilon, t \rangle \rangle$ and *Y* is of type $\langle \varepsilon, t \rangle$, then:
[[*Z*]] = $\lambda x \lambda e$ [[[*X*]](*x*) (*e*) & [[*Y*]](*e*)]

¹⁵Cf. e.g. Frascarelli (2006) for discussion.

¹⁶See section 2.2.3 for an explanation of these constraints with respect to the *nomen vicis* interpretation of *Ata*-nouns.

- (91) $[[X]] = \lambda x \lambda e [\text{Agent}(e,x) \ \& \ \text{event}(e)]$
 (92) $[[Y]] = \lambda e [\text{R}(e) \ \& \ \text{INITIATOR}(e)=x \ \& \ \text{DELIMIT}(e)]$
 (93) $[[Z]] = \lambda x \lambda e [\text{R}(e) \ \& \ \text{DELIMIT}(e) \ \& \ \text{event}(e) \ \& \ \text{Agent}(e,x)]$

The first node X in (90) contributes the possibility of having an external argument *via* the agentive role, the Davidsonian argument, and a characterisation of the eventuality as an activity. This is the contribution of the light verb. The second sister node Y in (90) contributes the Davidsonian argument, the characterisation of the event, by providing a root R for predicates of events. It contributes to aspect *via* constraints on the event atelicity and boundedness¹⁷, and contributes a characterisation of the eventuality as an activity *via* the requirement that it be associated with an entity that is an initiator. This is the contribution of the nominalisation. In the mother node Z, one gets the complex predicate that can apply to the external argument. The requirements on the event coming from the two sisters are combined. The free individual variable in Y is identified and brought into the domain of the lambda operator that binds the individual variable argument of Agent in X. The role composition in (90) is licensed in virtue of the fact that the role contributed by the nominalisation is (either equal or) subsumed by the role contributed by the head daughter. Thus, the weaker specification gets deleted. Next, the complex predicate built *via* (90) composes with the expression that provides a value for the external argument position associated with the agentive role, provided it has the required disposition.

Let's dwell on rule (90). The role composition turns out to be a sort of filter, because only entities with agentive dispositions can provide the value for the agent argument position. As just said, the role contributed by the nominalisation is subsumed by the role specified by the light verb, but is not identical to it. This situation results from the hybrid nature of the complex predicate. Let's proceed in a bottom up way. First, the nominalisation states a more general role of initiator. The external argument cannot be overtly realised, but it is conceptually present and a constraint is imposed on its interpretation. Three cases can be envisaged. When the root R would derive a verb that imposes a stronger constraint on the realisation of the thematic role associated with the external argument, it can also derive an *Ata* nominalisation. For instance, a verb like *nuotare* 'swim' requires an Agent, and initiator is a more general constraint. When the root R imposes a weaker constraint, such as Experiencer with psych verbs, the nominalisation cannot be derived, e.g. **amata* 'love-Ata', **conosciuta* 'know-Ata'. Finally, when the root R would derive a verb that does not impose an agentive role but is dynamic, and therefore potentially associated with a causal chain, the nominalisation can be derived, e.g. *caduta* 'fall-Ata'. Second, the light verb strengthens the general role introduced by the nominalisation by imposing the more specific role of Agent, which subsumes the initiator role.

Summing up, i) there is only an initiator in the nominalisation step, whether or not the root R would derive a verb that imposes an Agent role; ii) the light verb is a functional head that performs the syntactic operation of introducing the external argument, whose semantic counterpart is the operation of imposing an agentive requirement. It must be a true agent that must be able to be the first link of a causal chain.

From the composition of roles, and the status of first link of a causal chain, it follows that the subject of the light verb must refer to the same entity that is the initiator of the event described by the nominalisation, as illustrated in section 2.2.1. The conceptualisation of the event

¹⁷As said in section 2.3, aspectual constraints have been spelled out by Tovina (2015), but we use a simplified version because the focus of the discussion in this section is not on aspect.

described by the complex predicate as a unique causal chain allows us to integrate the entailments projected by the nominalisation into the complex predicate. The existence of such a unique causal chain shows in the relevance of agentive dispositions. When one considers the properties that are relevant for discharging the role of Agent of the light verb, these properties are those that are relevant for the event described by the nominalisation. Dispositions are properties ascribed to an entity that are perceived in the perspective of a manifestation. Assume the association of a causal chain to an event-type. Talking of agentive dispositions is a way of telescoping two pieces of information. On the one hand, agentive dispositions are properties ascribed to an entity and, on the other hand, those properties are seen as the first element of a causal chain leading to a class of events.

5 Conclusions

In this paper, we have offered a new argument for introducing dispositions in the analysis of natural language. We presented data drawn from complex predication in Italian that show the need for a finer-grained characterisation of the properties associated with the Agentive role. These fine-grained agentive properties were described as agentive dispositions. In the context of argument selection, an agentive disposition is a property that holds of the instantiator of the external argument position and is understood to be a power for the realisation of the event described by the event predicate of the clause.

The empirical case of *Ata*-nouns offers an interesting case for exploring the constraints imposed by verbal meaning on thematic positions. In nominalisations, traditionally the external argument is deemed suppressed, but in *Ata* nominalisations it is still semantically active. When the nominalisation is part of a complex predication, the semantic requirement within it is to be combined with the requirement of the external argument of a light verb with causative meaning.

Assuming that the light verb has undergone semantic bleaching, at least to a certain extent, and that it only preserves its causative meaning, it is then possible to reduce the (proto-)entailments of the light verb to a single entailment, namely that the subject of the verb be responsible for causing the event.

To conclude, let us stress that our argument for "active" (or rather, *agentive*) dispositions is not an argument against the "passive" dispositions analysis. We are not saying that *-able* adjectives such as *breakable* and their counterparts across languages shouldn't be analysed as expressing dispositions ascribed to an entity in a patient role. In our view, a theory of disposition can be considered, from the point of view of a linguist, as a theory of the different ways in which languages express dispositions. In this paper we take a specific empirical fact as our starting point, and we show that the notion of disposition can be useful to deal with a more general phenomenon, which is that of argument selection.

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Partial Manifestations

Nick Kroll

There has been a movement, growing over the last twenty years, to treat dispositionality as irreducible and, in turn, offer dispositional accounts of important metaphysical matters such as causation, the laws of nature, and modality. However, unlike the earlier turn towards possible worlds in metaphysics, the turn towards dispositions hasn't had much impact in semantics. But this is largely because semanticists have yet to consider what dispositional analyses of (say) tense, aspect, conditionals, generics, or modals would look like. My aim in this paper is to push the movement forward on both the metaphysics and semantics front by taking the first steps towards a dispositional account of events in progress (the metaphysics front) and the progressive aspect (the semantics front).

Keywords: Progressive Aspect, Dispositions

1 Introduction

Bad news. You just ingested some poison. Worse news. The poison is lethal: it is disposed to kill those whose ingest it. And the poison's disposition is manifesting. You are sweating, nauseous, and feel the end approaching quickly.

Good news. I have the antidote. Better news. I administer it and save your life.

The antidote prevented the manifestation of the poison's disposition. Sure enough, the poison was killing you. But it didn't kill you—thanks to the antidote.

In the literature on dispositions, something that prevents a disposition from either partially or fully manifesting (without taking away the disposition) is called a *mask*, and a disposition is said to be masked when a mask does its job. So, the antidote is an example of a mask, and it masks the poison's disposition to kill.¹

This case is also an example of something those working on the semantics of the progressive aspect are familiar with: *the imperfective paradox*. The imperfective paradox is simply the observation that an event in progress need not culminate, and so the inference from a past progressive to its perfective correlate is not, in general, a valid inference.² The past progressive *The poison was killing you* is true but its perfective correlate *The poison killed you* is false.

And so we might wonder:

- When events in progress fail to culminate, is it always in virtue of something interfering the manifestation of a disposition?

Further reflection might give rise to the more general question:

- Are events in progress simply partial manifestations of dispositions?

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¹The poison example is due to Bird 1998. Masks owe their name to Johnston 1992.

²Dowty 1977 was the first to stress the importance of the imperfective paradox in the semantics of the progressive. He also coined the phrase.

Let's suppose the answer is "Yes" to our more general question. Should semanticists working on the progressive care? Probably not that much if orthodoxy is correct. According to orthodoxy, both dispositions and progressives are to be analyzed in terms of possible worlds and so a tight connection between the progressive and dispositions might be somewhat interesting but overall not much of a surprise.³

Many theorists, however, have started to take seriously the view that dispositionality is irreducible.⁴ If this view is correct, then semanticists working on the progressive should care about whether events in progress are just partial manifestations of dispositions. For if events in progress are just partial manifestations of dispositions and dispositionality is irreducible, one would hope for, and expect, a dispositional analysis of the progressive.

Now I'm going to just assume that the view that dispositionality is irreducible should be taken seriously. My primary goal, then, is to get you to hope for, and expect, a dispositional analysis of the progressive by arguing that an account of events in progress as partial manifestations of dispositions is plausible and worth taking seriously. My secondary goal is take some steps toward satisfying your newfound desire for a dispositional analysis of the progressive. In short, my aim is to make some progress towards a dispositional account of events in progress and the progressive aspect.

2 Events in progress

Let's start with an initial attempt at an account of events in progress as partial manifestations of dispositions.

- (1) Necessarily, e is a Φ event in progress at t iff e is, at t , disposed to become a Φ event and this disposition is activated at t .

There are two features of this account of events in progress that immediately stand out. First, it ascribes dispositions to events. Second, it appeals to the notion of a disposition being activated.

First things first. Dispositions are usually taken to be properties of objects. Certainly, the standard philosophical examples of dispositions (fragility, solubility, irascibility, etc.) are properties of objects. So, it might seem a bit odd to think of events as having dispositions. Some might even claim that it is a category mistake to ascribe dispositions to events.

However, if we think of dispositionality as a special sort of potentiality, then there shouldn't be a problem with ascribing dispositions to events.⁵ Consider a well-worn example for the literature on the progressive. Suppose Mary went for a walk and in doing so partially crossed the street only to be run over by a bus.⁶ Now Mary's walk has variety of properties. And one property it has, during a certain stretch of time anyways, is the property of being a crossing the street event in progress. And this property is one that involves potentiality. Indeed it seems to involve partially actualized potentiality. To put it another way, if e is an event of Mary crossing the street in progress, then e has the potential to become an event in which Mary crosses the

³See Asher 1992, Bonomi 1997, Dowty 1979, Higginbotham 2009, Landman 1992, and Portner 1998 for a sampling of the orthodoxy concerning the progressive. See Choi 2008, Goodman 1954, Lewis 1997, Manley and Wasserman 2008, and Steinberg 2009 for a sampling of the orthodoxy concerning dispositions.

⁴See Bird 2007, Ellis and Lierse 1994, Molnar 2003, Mumford 1998, and Vetter 2015 for a sampling.

⁵Thinking of dispositionality as a special sort of potentiality doesn't imply a reduction of dispositionality any more than thinking of knowledge as a special sort of mental state implies a reduction of knowledge (which it doesn't). Also, see Vetter 2015 for a reduction of modality to potentiality.

⁶This example, I believe, begins with Dowty 1979.

street, a potentiality which has been partially actualized. This should be relatively uncontroversial. But if it is, then it shouldn't be controversial to think of events as having dispositions: Mary's walk, for a certain stretch of time, has the property of being disposed to become one in which she crosses the street.

But one might object that I'm moving too quickly. Potentiality, after all, doesn't imply dispositionality. A coin may have the potential to land heads without being disposed to land heads. So, I shouldn't be moving so quickly from an event having a certain potentiality to an event having a certain disposition.

Well, take the coin. It is disposed to land heads or tails even though it is not disposed to land heads or disposed to land tails. But for any coin, if it has the potential to land heads or tails, then it must be that either the coin has the potential to land heads or the coin has the potential to land tails. In general, if x is disposed to F or G , then it doesn't follow that x is disposed to F or disposed to G ; but if x has the potential to F or G , then it does follow that x has the potential to F or the potential to G . This is one of the ways in which dispositionality is a special kind of potentiality.

But Bonomi's *multiple choice paradox* shows that events bear this mark of dispositionality. Here's Bonomi's illustration of the paradox.⁷ Suppose Leo has decided to drive to Paris or Metz and is using the first part of his drive, the part before the road forks, to make his final decision. Then, during the first part of his drive, Leo is driving to Paris or Metz even though he's not driving to Paris or driving to Metz. Thus, we also find an important mark of dispositionality in the case of events in progress. I conclude, then, that it isn't some kind of category mistake to ascribe dispositions to events. In Bonomi's example, we have an event that is disposed (at a certain time t) to become a Leo drives to Paris or Metz event even though this event isn't disposed (at t) to become a Leo drives to Paris event or disposed (at t) to become a Leo drives to Metz event.

Let's now turn the other feature of (1) that immediately stands out: the notion of a disposition being *activated*. Some salt is stored in a jar. It's taken out, placed in water, and dissolves. When the salt was in the jar, its disposition to dissolve was dormant. When it was placed in water, its disposition to dissolve was activated. And this is all that is meant by "activated": a disposition is activated just in case it isn't dormant.

A further clarification might be necessary to avoid a possible misunderstanding. It is often assumed that any given disposition is associated with a manifestation type and a stimulus condition. So, for example, solubility is associated with the dissolving, its manifestation type, and being submerged in water, its stimulus condition. Following Vetter 2015, I'm skeptical of the claim that a disposition must have a stimulus condition. But let's put that aside. The important point is that one shouldn't assume that a disposition is activated whenever its stimulus condition obtains. Some salt can be submerged in water without its disposition to dissolve being activated. Just suppose it is encased in plastic. The stimulus condition for the salt's disposition to dissolve obtains. But the plastic prevents the disposition from being activated. Generalizing, a mask can prevent a disposition from manifesting even though it is activated (e.g., the poison case). And it can prevent a disposition from manifesting by preventing it from being activated in the first place (e.g., the salt case). Let's now see why we need the activation condition in (1).

We need the condition that the disposition be activated because it seems possible for an

⁷Bonomi 1997 offers more than one illustration of the paradox. The example that follows involves an agent. But Bonomi offers another example without agents to show that the paradox doesn't crucially involve agency.

event to be disposed to become a Φ event even though this disposition is dormant. I'm not sure if I have a completely convincing example of such a scenario. But here's a try.

Suppose you need your computer to run a large number of tasking processes. However, you know that the computer is disposed to overheat when it runs such processes. So you take extreme measures: you rent a commercial air-conditioner and set it at its lowest setting. You are now freezing but at least the computer can do its work. Suppose it does. It seems to me that this *event* of the computer running such and such processes is an event disposed to become one in which the computer overheats. However, the air-conditioner *masks* this disposition: it prevents the disposition from being activated in the first place and so prevents even a partial manifestation of the disposition.

As I said, I'm not sure if this is a completely convincing example. Thinking about it, however, convinces me that it should be possible to come up with a completely convincing example. But if I'm wrong, we could drop the activation condition on the grounds that whenever an event is disposed to become a Φ event, this disposition is activated.

In any case, it is time to address *the problem* with (1). To state the problem, we need to briefly describe a distinction made in the study of lexical aspect. This is the distinction between telic and atelic verb phrases (VPs). The distinction is sometimes characterized in terms of culmination or temporal boundedness. Simplifying somewhat, the idea is this. Take a simple sentence in the simple past. If the sentence describes a situation as one that involves a culmination/temporal bound, then its (uninflected) VP is telic. Otherwise, its VP is atelic. For example, *Willa built a house* describes a situation as one that involves a culmination/temporal bound: namely, the point at which Willa finishes building the house. So, the VP *build a house* is telic. On the other hand, *Mirah walked* doesn't describe a situation as one that involves a culmination/temporal bound.⁸ So, the VP *walk* is atelic. Another feature of atelic VPs is that they, unlike telic VPs, are homogeneous in the sense that if α is a sentence with an atelic VP and α is true of a sufficiently extended situation s , then s can be divided in sub-situations (with no remainder) such that α is true of each these sub-situations. In short, if *Mirah walked* is true of an sufficiently extended event, then that event can be divided into smaller events such that *Mirah walked* is true of each of the smaller events. This is not the case with *Willa built a house* or any other sentence with a telic VP.⁹

To extend the telic/atelic distinction event types, we can say that Φ is a telic event type just in case what it is to be a Φ event involves having a culmination/temporal bound; otherwise Φ is an atelic event type.

Now for the problem with (1). I've been careful with the examples I used in clarifying (1). Each example has been a telic event in progress. But consider an atelic event in progress like one of Mirah walking. There is something odd saying that such an event is disposed to become a Mirah walks event. What's odd is that any sufficiently extended event in progress of Mirah walking is already a Mirah walks event. So how can it be disposed to become one if it is already one?

In previous work, I appealed to resultant states to get around a similar issue.¹⁰ I'll do the same here. A resultant state is a state of an event having taken place. So, if Willa built a house,

⁸Of course, the VP *walk* could be true of an event that has a culmination. For example, if an event of Willa walking to the store is one that has a culmination, and *walk* would be true of such an event. But *walk* doesn't describe the event as involving a culmination.

⁹See Rothstein 2004 for a much richer overview and discussion of telecity.

¹⁰See Kroll 2015.

then there is a state of Willa having built a house. Such a state is a resultant state of the respective Willa builds a house event. Likewise if Mirah walked, then there is a state of Mirah having walked. Such a state is a resultant state of the respective Mirah walks event.¹¹

To see how resultant states help, observe that a sufficiently extended Mirah walks event is made up of other Mirah walks events, each of which has a corresponding resultant state. For example, suppose Mirah walked from point A to point D. Then there is, among others, a Mirah walks event that begins at point A and stops at point B and another one that stops at point C. The one that stops at point C is temporally larger than the one that stop at B. So, the resultant state of the one the stops at point C is a resultant state of a Mirah walks event that is larger than the one that ends at point B.

Here's the idea then: at any time during Mirah's walk, the event is disposed to bring about a resultant state of a "larger" Mirah walks event. More formally:

- e is a Mirah walks event in progress at t iff (i) e is, at t , disposed to bring about a resultant state of a Mirah walks event at some $t' > t$, and (ii) this disposition is activated at t .

It follows from this proposal that an event in progress of Mirah walking brings about resultant states of ever (temporally) larger Mirah walks events. So, we have a nice way capturing the "progress" of such an event in progress.

Generalizing from this treatment of Mirah's walk, we get a dispositional account of events in progress that covers both atelic and telic events in progress.

- (2) Necessarily, e is a Φ event in progress at t iff (i) e is, at t , disposed to bring about a resultant state of Φ event at some $t' > t$, and (ii) this disposition is activated at t .

To see how this proposal handles telic events in progress, note that when Φ is replaced by a telic event type, the manifestation of such a disposition would be the culmination of the event in progress and so the manifestation would not only amount to the event becoming a Φ event but also serve a temporal bound for the event in progress.

We have, then, a dispositional account of events in progress that covers both telic and atelic events in progress. While I haven't offered a thoroughgoing argument for this account of events in progress, I hope to have made a fairly convincing case that the account is plausible and worth taking seriously. So, given our earlier assumption that irreducible dispositionality is a position worth taking seriously, you should suddenly find yourself with a desire for a dispositional analysis of the progressive aspect.

3 The progressive

Here's the analysis one gets from the above account of events in progress. Let φ be a variable over base clauses (i.e., simple sentences stripped of tense and aspect) that denote event types. And let $[[\varphi]] = \Phi$. Then:

- (3) Necessarily, $Prog[\varphi]$ is true at t iff there is an event e such that e is, at t , disposed to bring about a resultant state of a Φ event at some $t' > t$, and (ii) this disposition is activated at t .

¹¹Resultant states might seem like "ghostly" entities. Maybe they are. But that's not a serious objection to their existence. In any case, Parsons 1990 was the first to bring resultant states to light. Since then they have been put to a variety of uses in semantics and metaphysics. See Parsons 1990, Szabo 2006, and Zimmerman 2011.

(3) predicts that *Mary is crossing the street* is true iff there is an event with an activated disposition to bring about (at some later time) a state of Mary having crossed the street. And it predicts that *Maeva is dancing* is true iff there is an event with an activated disposition to bring about (at some later time) a state of Maeva having danced.

Let me stress again that we are working under the assumption that dispositionality is irreducible and so not to be given a modal analysis. We are also working under the assumption that events in progress are to be understood as partial manifestations of dispositions. Given these two assumptions, I'm not going to argue for (3) by comparing it to the orthodox modal analyses of the progressive. This is because, given the two assumptions, modal analyses of the progressive are already off the table.

I will, however, argue for (3) by highlighting some virtues of the analysis of the progressive.

First, the analysis offers an explanation of the imperfective paradox. Simplifying matters, an event can have an activated disposition to become a Φ event without ever becoming a Φ event. So, the inference from a progressive to its perfective correlate will not, in general, be valid.

Second, the analysis offers an explanation of the multiple-choice paradox. As was already mentioned, an event can be disposed to become a Leo drive to Paris or Metz event without being disposed to become a Leo drive to Paris event or a Leo drive to Metz event. So, the analysis predicts that *Leo was driving to Paris or Metz* does not entail either *Leo was driving to Paris* or *Leo was driving to Metz*.

Third, the analysis offers an explanation of the apparent opacity of the progressive. Just as Sven, when pumpkin picking, can be disposed to pick a large pumpkin even though there is no particular large pumpkin such that Sven is disposed to pick it, an event can be disposed to become one in which Sven picks a pumpkin even though there is no particular pumpkin such that the event is disposed to become one in which Sven picks that pumpkin. So, (3) can account for the (default) reading of *Sven is picking a pumpkin* under which the sentence does not entail that there is a pumpkin such that Sven is picking it.¹²

Lastly, the analysis provides substance to the main rival to possible world analyses of the progressive: partitive analyses. The most interesting partitive analysis is the partial realization analysis considered, but not endorsed, in Landman 1992. The basic idea of the analysis is that *Prog*[\(\varphi\)] is true iff there is an event that partially realizes the event type Φ . The main problem with this analysis is that it gives rise to the question: just what is it for an event to partially realize an event type? Sure enough, one could analyze partial realization in terms of possible worlds: roughly, e partially realizes Φ iff e would fully realize Φ if it were to continue without interruption. But then the partial realization analysis collapses into a modal analysis of the progressive. (3), however, is a non-modal analysis of the progressive that provides the right kind of answer: for an event to partially realize an event type Φ is for the disposition of the event to become a Φ event to be partially manifested. In other words, partial realization is to be understood as partial manifestation.

In closing, let me briefly say why I take this last virtue to be the most interesting virtue of the analysis.

¹²The pumpkin picking example is found in Stechow 1999, who credits the example to Angelika Kratzer.

4 Concluding remarks

The movement to treat dispositionality as irreducible and, in turn, offer dispositional accounts of important metaphysical matters (such as causation, the laws of nature, and modality) hasn't had much impact in semantics. But this, it seems to me, is largely because semanticists have yet to seriously consider what dispositional analyses of tense, aspect, conditionals, generics, modals, and so on would look like. Now (3) might only be the first step towards a proper dispositional analysis of the progressive. Nonetheless, it allows us to appreciate partitive analyses of the progressive in a new and interesting light. Indeed, it strikes me that (3) serves the most substantive and illuminating partitive analysis of the progressive to date. Thus, the analysis serves not only as a first step towards a dispositional analysis of the progressive but also as a motivation to develop dispositional analyses in other areas of semantics.

In any case, with (2) and (3), I hope to have made some progress towards a dispositional account of event in progress and the progressive; and, in doing so, pushed the dispositionalism movement forward on both the metaphysics front and the semantics front.

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Grammatical and conceptual knowledge of dispositions in the interpretation of *-er* nominals: Experimental evidence

Isabelle Roy
Bridget Copley
Savaria Colonna
Sudha Arunachalam

In this paper we consider how *grammatical* and *conceptual* knowledge affect children's and adults' interpretation of derived *-er* nominals such as *cutter of branches* (a phrasal *-er* nominal) and *branch cutter* (a compound *-er* nominal) in English. While they both make reference to dispositions, their different grammatical structures affect their interpretation: phrasal *-er* nominals make reference to dispositions that only agents can have, while compound *-er* nominals make reference to dispositions that either agents or instruments can have. This study presents three experiments, based on picture selection and definition tasks. Our findings reveal a difference between structurally-derived and non-structurally-derived (i.e., purely conceptual) meaning, and in the nature of linguistic reference to dispositions – namely, that such reference is possible in both a structurally-derived and a non-structurally-derived fashion, associated, we hypothesized, with different, namely *automatic* vs. *controlled*, cognitive processes.

Keywords: dispositions, derived *-er* nominals, agent, instrument, English, grammatical knowledge, conceptual knowledge.

1 Introduction

Several classes of derived forms have been argued to make reference to dispositions; for instance, *-able* adjectives (*soluble*, *breakable*), and names for jobs or activities like *teacher*, *jogger*. Here we focus on English *-er* nominals, of which there are two morphosyntactically distinct kinds: phrasal *-er* nominals (*saver of lives*) and compound *-er* nominals (*life saver*). In both cases there seems to be a reference to a disposition for the action to occur under normal circumstances. That is, a *life saver* and a *saver of lives* both have some sort of disposition to save lives under appropriate, normal, or stereotypical circumstances.¹

We consider these because while they have similar dispositional meaning, their different grammatical structures have been argued to affect their interpretation, and in particular the

¹ This notion of disposition is a little less complex than the usual philosophical notion of disposition, only in that the circumstances are not specified other than being appropriate, normal, or stereotypical. Cf. *fragile*, in which something breaks *when struck*, where *when struck* is a rather precise specification of the circumstances.

way in which they make reference to events. The most striking interpretive difference between them is that phrasal *-er* nominals can only refer to agents, while compound *-er* nominals can refer to either an agent or an instrument used to perform the event.

Though it is generally agreed that this interpretive difference is driven by differences in grammatical structure, there has been much discussion about the precise cause. Rappaport Hovav & Levin (1992) suggest that this difference in judgments stems from the idea that only phrasal *-er* nominals have an underlying event argument, associated with the presence of an agent: their claim is that phrasal *-er* nominals are *eventive* and compound *-er* nominals are *non-eventive* (see Grimshaw 1990). Following recent theories on nominalizations (van Hout & Roeper 1998, Borer 1999, 2003, Alexiadou 2001, among others), the source of the difference between eventive/non-eventive nominals in general is related to a structural difference: eventive nominals are derived from verbal structures that involve verbal and aspectual layers, whereas non-eventive nominals are derived from roots directly and therefore do not exhibit properties associated with verbs, such as the ability to have arguments or the ability to take aspectual and temporal modifiers.

- (1) a. eventive nominals: [NP N [vP/AspP [root]]]
 b. non-eventive nominals: [NP N [root]]

While most subsequent work on *-er* nominals agrees that there is a correlation between having an event interpretation and the presence of complex internal verbal and/or aspectual structure (Alexiadou & Schäfer 2008, 2010; Roy & Soare 2012, 2014; but see Borer 2013: chap. 12 for a contrastive view), authors disagree on whether the distinction between phrasal vs. compound *-er* nominals should be explained simply in terms of this correlation. Alexiadou & Schäfer (2008, 2010) argue, contra Rappaport Hovav & Levin, that *-er* nominals *always* have an event interpretation, and that any differences between readings, and specifically whether or not an actual event is entailed to have occurred, derive from a fundamental split between episodic vs. dispositional eventive *-er* nominals. Only the former entail that an actual event has taken place (e.g., *a saver of lives* must have saved lives). The dispositional meaning does not (e.g., *lifesaver*, who does not need to have saved lives but need only have a disposition to save lives). However, for Alexiadou & Schäfer, all *-er* nominals are cases of grammatical event nominals.

Roy & Soare (2012, 2014), too, argue that animate phrasal *-er* nominals are complex event nominals, and that the dispositional reading results from binding by a generic operator. However, they argue that the Alexiadou & Schäfer's episodic/dispositional distinction alone cannot account for the structural and interpretational properties of *-er* nominals. Instead, they use that distinction in combination with Rappaport Hovav and Levin's eventive/non-eventive distinction.

Crucially, unlike Alexiadou & Schäfer, Roy & Soare account differently for the readings of compound *-er* nominals (*branch cutter*). For Alexiadou & Schäfer, instruments share the same internal structure as dispositional animate nominals, and hence represent a further case of grammatical dispositions. For Roy & Soare, this is not the case. They argue that compound *-er* nominals do not exhibit any of the event-related properties exhibited by dispositional animate *-er* nominals. We refer the reader to these papers for the precise arguments based on the distribution of adjectival modification (of the type *frequent/constant* and *old/happy*) with an event reading, related to the inner event contributed by a putative verbal base. Compound *-er* nominals, it is concluded, are not complex event deverbal nominals, but rather mere nominalizations of a root (and verbal/aspectual layers are therefore not realized).

Consequently, compound *-er* nominals do not involve an event variable, and accordingly there is no event variable in the structure to be bound by a dispositional or generic operator. The crucial point here is that the dispositional meaning of compound *-er* nominals cannot be linked to grammatical properties. Thus, the two kinds of *-er* nominals, though they both make reference to dispositions, do not make reference to dispositions in the same way. For phrasal *-er* nominals the reference to dispositions is calculated through grammatical structure, while compound *-er* nominals make reference to dispositions merely through conceptual knowledge.

These two sources of dispositional meaning differ in the kind of knowledge they presume. Grammatical (or structural) knowledge is the knowledge of grammatical structure, which plays an essential role in calculating the truth-value of phrases, for instance; conceptual (or real-world or lexical) knowledge, on the other hand, is associated with what is commonly thought of as lexical or encyclopedic knowledge. Structurally, both types of knowledge are by assumption associated with radically different representations. Grammatical knowledge is contributed by functional structure that is visible to syntax; in recent decompositional analyses it typically involves dedicated functional heads, or the presence of a variable in structure. Conceptual knowledge is not concerned with functional structure, but rather with the meaning of roots (Borer 2005 among many others). It is the meaning shared, for instance, by a series of words like ‘forest’, ‘forestry’, ‘deforestation’, that share a common concept ‘forest’, but whose categorical and grammatical properties may differ.

Compound *-er* nominals involve reference to objects and agents that are seen as having (mere) ‘conceptual’ dispositions: the dispositional sense comes from our knowledge of the world, and it is not associated to any piece of structure or semantic component that the grammar perceives and computes. For instance, names for instruments are simple names of entities, just as other words like *table*, *flower*, *notebook*, which happen not to have a particular association with a disposition. We adopt this analysis here (but see Roy & Soare 2013 for a more detailed discussion of the distinction between conceptual vs. grammatical event nominals more generally).

To summarize, our starting point for understanding the interpretations assigned to phrasal and compound *-er* nominals is that, as Rappaport Hovav & Levin argued, phrasal and compound *-er* nominals have similar conceptual meaning, but different grammatical properties, resulting in an interpretive difference. Dispositional meaning can arise either grammatically or conceptually. Phrasal *-er* nominals require their referent to have an agent and a disposition that is constrained by the grammatical information, while the referent of compound *-er* nominals may have a mere conceptual disposition.

Phrasal and compound *-er* nominals thus provide a good minimal pair to test to what extent adults use grammatical information in phrasal *-er* nominals as a source of meaning. Specifically, we predict that if grammatical information is used exclusively, dispositional animate phrasal *-er* nominals and instruments will be treated differently. On the other hand, if conceptual knowledge is prevalent, we expect to see less difference between animate dispositions and instruments. The aim of the current study is, thus, to test *-er* nominal judgments experimentally as a case study for conceptual vs. grammatical knowledge. However, in so doing we will attempt to control for dispositional meaning, a possibility now afforded by new understanding based on recent research on dispositions in *-er* nominals. We test adults – whom we know have fully acquired the requisite grammatical knowledge – to understand what factors influence the use of conceptual and grammatical knowledge for reference to dispositions.

2 Prior work

Only a few experimental studies have investigated interpretations of *-er* nominals, and they have taken primarily an acquisition perspective; no experimental study has been done so far on adults with the goal of understanding reference to dispositions. Clark & Hecht (1982) used an elicited production task to encourage children to produce novel *-er* nominals by asking, e.g., “What would we call someone who / something that opens things?”, finding, as predicted, that children used *-er* nominals such as “opener” to refer to agents more often than instruments. Randall (1982) used a picture selection task to explore children’s agentive interpretations of *-er* nominals like “a biker with no hands”, finding that 5-year-olds incorrectly allowed the modifier “with no hands” to modify the event of riding rather than the agent himself; that is, they sometimes chose a picture in which the biker had hands but did not apply them to the bike. These results were interpreted to mean that children encode different information in the structure of *-er* nominals than adults. In a follow-up, van Hout & Bos (2004) tested 5-year-olds and adults to ask more precisely how children’s interpretations of these nominals might differ from adults’. Specifically, they asked whether participants restricted phrasal *-er* nominals to agents, as their structure requires. First, in a picture selection task, they tested only phrasal *-er* nominals (e.g., *catcher of flies*), and asked participants to choose between an agent picture (e.g., a man swatting at flies with a flyswatter), and an instrument picture (e.g., a flyswatter). Their results were surprising: while both children and adults preferred agent interpretations for phrasal *-er* nominals, neither group did so 100% of the time. Children chose agents on 71% of trials, and adults on 88%. Recall that according to the traditional linguistic description of phrasal vs. compound nominals, phrasal nominals are ungrammatical with an instrument interpretation (i.e., *a catcher of flies* can only refer to an agent).

To follow up on this unexpected result, van Hout & Bos introduced both phrasal and compound *-er* nominals in a truth value judgment task; they asked adults and children whether agent and instrument pictures were appropriate depictions of these nominals. Again, the results were surprising: in the phrasal condition (e.g., *catcher of flies*), adults accepted the agent interpretation 50% of the time and the instrument interpretation 32% of the time. In the compound condition (e.g., *fly catcher*), they accepted the agent interpretation 67% of the time and the instrument interpretation 57% of the time. Thus, although they did show the expected decrease in acceptance for instrument as compared to agent interpretations of phrasal nominals, they still accepted these one third of the time. This is even more striking given that overall they were quite conservative, in general only accepting any picture to represent the referent of an *-er* nominal a little over half the time. Children showed a different pattern, accepting both agent and instrument interpretations for both phrasal and compound nominals at similar (high) rates; their acceptance rates for all four conditions were between 84% and 89%, suggesting that they did not discriminate between the linguistic conditions. van Hout & Bos concluded that by 5 years of age, children are not yet able to use structural information to correctly map phrasal *-er* nominals to agents, and that their syntactic representations for phrasal and compound nominals are the same.

However, we think this conclusion is too hasty. The poor performance of adults, whom we expect to have full structural knowledge, suggests that participants were not accessing this knowledge for some reason. We propose that the experimental materials did not control for dispositional meaning, and that this hindered adults’ success. Therefore in the current study, we take their results as a starting point for further exploring adults’ interpretations of *-er* nominals. Our goal was to advance the methods used by van Hout & Bos by taking into account dispositional meaning (Roy & Soare, 2012, 2014). Thus, in the present study, we

aimed to examine adults' interpretations when we control for the contribution of dispositions. In Experiment 1, we aimed to *increase* to a comparable level the conceptual information about dispositions of both the instrument and agent. We hypothesized that by controlling for conceptual information about disposition, by making both dispositions conceptually salient, we would be able to isolate effects of structural knowledge. However, this was not what we found; instead, conceptual information still played a role. Therefore, in Experiment 2, we pursued the opposite course: we aimed to *decrease* the conceptual information about dispositions we provided to an absolute minimum, again seeking to control for such information to allow structural knowledge to drive adults' interpretations of *-er* nominals. Our findings reveal that, indeed, when conceptual information is absent, structural knowledge drives interpretation. Taken together, these two experiments offer a new way of thinking about how adults derive interpretations for *-er* nominals, and in turn, suggest that the question of how this grammatical knowledge fares in acquisition cannot be pursued without a full understanding of how conceptual and dispositional information contribute.

3 Experiment 1: Increasing the Salience of Agent Disposition

The goal of Experiment 1 was to determine if increasing the salience of the dispositions of the agent would improve performance, allowing adults to perceive the agent as dispositional and therefore a better candidate for the referent of a phrasal *-er* nominal than they have in previous research. We used very similar methods as in the picture-selection experiment in van Hout & Bos (2004), but with different stimuli and incorporating both phrasal and compound conditions in a single design.

One primary change we made to the paradigm used by van Hout & Bos was in the visual stimuli we chose to depict the potential referents of the phrasal and compound *-er* nominals. As van Hout & Bos themselves surmised, the pictures they used to depict agents seemed to favor an episodic reading rather than a dispositional one, because the agents were depicted performing the action at the time, but were not necessarily canonical agents of the action. This would introduce another difference between the depicted agents and instruments, namely, that the instruments had strong, clear dispositions in the real world, while the agents did not. Accordingly, we used stimuli that did not represent the agent as performing the event, but rather as being someone who typically performs the event, and wearing the typical attributes related to the event with no representation of dynamicity (a uniform, for instance). Additionally, before asking participants to choose the appropriate picture, we described both the agent and object in such a way that each of their dispositions was explicitly identified. For example, for the nominal *branch cutter* or *cutter of branches*, before making a judgment participants were told, "Here's someone whose job is to take branches of trees so the sun can shine through" about the agent, and "This is something you can use to get branches off trees" about the instrument. By controlling for conceptual information about dispositions, our goal was to tease apart the contribution of the grammatical knowledge in assigning a referent to the pictures. We predicted that the participants relying primarily on grammatical knowledge would distinguish between dispositional agents and instruments, as they have different internal structure, and would thus show a strong preference for assigning agent interpretations to phrasal *-er* nominals. However, if the participants rely primarily on conceptual knowledge, they should make no distinction, as both dispositional agents and instruments have conceptual dispositions (although the source of the dispositional reading varies in both cases, as agents but not instrument can also have grammatically-expressed dispositions). The outcome would be similar preferences across syntactic conditions.

3.1 Methods

3.1.1 Participants

Sixteen adults, recruited from in and around Boston, MA, were included in the final sample. All were native speakers of English, speaking or hearing other languages less than 35% of the time, and provided informed consent according to procedures approved by Boston University's Institutional Review Board.

3.1.2 Materials

Visual stimuli were pictures, drawn by an artist, of people and objects. See Fig. 1 for an example. The agent and instrument pictures for each trial appeared side-by-side, with left-right positioning counterbalanced across trials. The auditory stimuli consisted of a script read by an experimenter to the participant, described below.

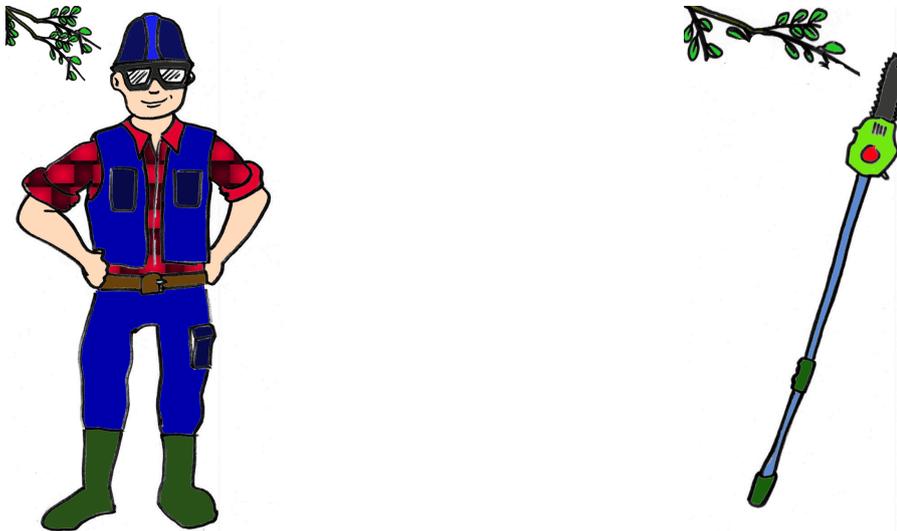


Figure 1. Example stimuli from one trial (cutter of branches / branch cutter)

3.1.3 Apparatus and Procedure

The experiment was presented in PsyScope (Cohen et al., 1993) on a desktop computer. The experimenter sat beside the participant. A second experimenter sat off to the side and hand-coded all responses.

The experiment consisted of two training trials, 10 target trials, and 10 filler trials. Target and filler trials were interleaved. Target trials always depicted an agent and instrument dispositionally related to the event described.

Because we wanted to establish a procedure that could eventually be extended to acquisition research, given that this has been the focus of prior experimental work on this topic, we embedded the task in a game in which the participant is to help a puppet from outer space who is learning English. On each trial, the experimenter read from a script that introduced both a person (on half of the trials) and an object (on half of the trials), and described the dispositions of both. For example: "Here's someone whose job is to take branches of trees so the sun can shine through. And this is something you can use to get branches off trees." The order in which the person and object were introduced was counterbalanced across trials. Next, the experimenter asked the test query, for example, "Now we're going to teach Alvin the Alien. Can you show Alvin the cutter of branches?"

The experimenter told the participant that the game was designed for children and that they would be asked to “show Alvin” on each trial.

Training and filler trials also always depicted a person and an object, and the story related them, but the test query was always a label for one of the two depicted entities, e.g., “Where is the clown?”. Some filler trials included multimorphemic referents (e.g., “Where is the fairy princess?”) to make them more similar to the target trials.

Participants were randomly assigned to one of four presentation lists. The set of pictures was identical in all lists. In two of the lists, the item queried on target trials differed from the other two lists; in lists A and B, the experimenter asked “Where is the cutter of branches?” and in lists C and D, “Where is the branch cutter?”. In each list, half of the target trials queried phrasal nominals, and half queried compound nominal. Lists A and C differed from B and D only in order; lists B and D presented the trials in reverse order.

Participants’ pointing responses were recorded by both experimenters: the first experimenter pressed the “f” or “j” key for the participant’s left or right point, respectively, and keystrokes were recorded by PsyScope; the second experimenter recorded all points on a paper coding sheet. The two coding responses were cross-checked, with 100% agreement.

3.1.4 Predictions

Idealized performance is depicted in Table 1. If participants use only structural information to guide their responses, then they should choose the agent picture 100% of the time on phrasal nominal trials, and 50% of the time on compound nominal trials.

	Agent	Instrument
Phrasal	100%	0%
Compound	50%	50%

Table 1. Idealized performance

3.1.5 Results

Participants gave correct responses on 100% of training and filler trials. On 11 out of the 160 trials in total, they responded that both pictures were correct; these trials were excluded from analysis. On the remaining trials, as shown in Table 2, on phrasal nominal trials, participants chose the agent picture 73% of the time, and on compound nominal trials, 21% of the time. Because this is a forced-choice task, instrument selection is the inverse. We used a chi-square test to determine if they chose the agent picture more or less often than chance performance in each condition. In the phrasal condition, they chose the agent picture significantly more often than chance ($X^2(1) = 15.6, p < .0001$), and in the compound condition, significantly less ($X^2(1) = 24.7, p < .0001$), and performance in the two conditions differed significantly from each other (Fisher’s exact test, $p < .0001$).

	Agent
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Phrasal	73%
Compound	21%

Table 2. Actual results from Experiment 1. The percentage of trials on which participants chose the agent on phrasal and compound nominal trials.

3.1.6 Discussion

The results reveal that while, as predicted, adults are sensitive to the structural differences between phrasal and compound nominals, their performance is far from the idealized predictions in Table 1. We interpret this to mean that factors other than grammatical structure are informing their judgments. Our approach in this experiment was to highlight the real-world dispositions of both agent and instrument in order to ensure that both were, at least with regard to conceptual disposition, appropriate referents for the nominal. However, this approach did not result in greater sensitivity to structural information than seen in van Hout & Bos. We suspected that this was because participants were using real-world knowledge to inform their interpretations, and that this real-world knowledge biased them to select instruments because the canonical nominal formations we used bring to mind real instruments such as potato peelers, window wipers, and potato mashers. Even in the phrasal condition, then, this real-world knowledge may have overridden structural knowledge to lead participants to focus on those real-world objects. Thus, in Experiment 2, we took the opposite approach: we reduced the amount of lexical/conceptual information available, and provided no information about dispositions, in order to block access to conceptual information as a relevant source for interpretation.

4 Experiment 2

In Experiment 2, we presented adults with phrasal and compound nominals, but absent any visual stimuli, in order to minimize the availability of conceptual/real-world knowledge. Instead of a picture selection task, we used a definition task. The definition task offers several advantages over picture selection; it allows us to present the linguistic stimuli without visual stimuli, which reduces the amount of conceptual/real-world information, and it also allows participants to imagine any referent, rather than being constrained to two choices. We hypothesized that this task would encourage adults to use structural knowledge to inform their definitions.

In Experiments 2b and 2c, we used novel nominal formations like *flattener of cushions* (Experiment 2b), and with novel words like *gazzer of towels* (Experiment 2c). These novel nominals allowed us to minimize conceptual/real-world knowledge even further by blocking access to lexical cues. But first, in Experiment 2a, we had to ensure that response patterns would not change simply as a function of the change in task from picture selection to definition. Therefore, Experiment 2a presented the exact same linguistic stimuli as in Experiment 1.

Experiment 2a

The goal of Experiment 2a was to see if we would replicate the results of Experiment 1 with a definition task. We presented the same items as in Experiment 1, but in a questionnaire in which they were simply asked to provide definitions for the nominals.

4.1 Methods

4.1.1 Participants

Twenty-four adults, recruited as in Experiment 1, completed a definition task in the form of an offline questionnaire. All were native speakers of English, none of whom had participated in Experiment 1.

4.1.2 Materials

The items used in Experiment 1, *-er* nominals presented in either a phrasal (e.g., *peeler of carrots*) or a compound condition (e.g., *carrot peeler*), were used in this experiment as well, except that no pictures were presented. In addition to the target items, 21 filler items were included to distract participants from the true purpose of the study. Fillers were known compound words (e.g., *carwash*) or *of*-phrases (e.g., *lily of the valley*), half of which referred to objects, and the other half to people. As with Experiment 1, two presentation lists were constructed; each target item was presented in either the phrasal or compound nominal form, but participants saw items of each type. Filler trials were interspersed.

4.1.3 Procedure

The participants completed the questionnaire online, via the Internet-based platform IbexFarm (Internet Based EXperiment, <http://spellout.net/ibexfarm/>). They were instructed to carefully read each item and “to define it as you would for a dictionary or for someone who doesn’t speak English very well”. Each item was followed by a prompt with a blank line, and subjects had to fill in the blank with a definition. Items appeared on the screen one by one, and participants could not return to earlier items. Completing the online questionnaire took less than 30 minutes.

4.1.4 Results

Responses were coded according to whether participants chose an agent or an instrument interpretation. On 20 of the 240 total items across all participants, both agent and instrument interpretations were evident (e.g., “a person or thing that ...”), and on an additional 32 items, neither was evident (e.g., “I don’t know”, or “a retail outlet where one can buy wipers” for the item *window wiper*). These trials were distributed fairly evenly across conditions (52 in the compound nominal condition; 62 in the phrasal nominal condition).

Of the remaining responses, in the phrasal nominal condition, an agent interpretation was given 79% of the time, and in the compound nominal condition, an agent interpretation was given only 29% of the time. Chi-square tests revealed that these differences were significant; in the phrasal condition, they chose the agent interpretation significantly more often than chance ($X^2(1) = 29.225$, $p < .0001$), in the compound condition, significantly less ($X^2(1) = 17.021$, $p < .0001$), and performance in the two conditions differed significantly from each other (Fisher’s exact test, $p < .0001$). (Note: To avoid inflating the apparent effects, we included “both” and “neither” responses in the chi-square analyses here and below.)

4.1.5 Discussion

Performance was strikingly similar to Experiment 1. Again, participants preferred the agent interpretation for phrasal *-er* nominals, and the phrasal and compound conditions differed from each other, but their agent preference in the phrasal condition is far lower than the 100% predicted preference. The fact that instruments express dispositions seems to allow them to be selected in the phrasal condition, even though this interpretation is ungrammatical. This suggests that subjects were in part led by their conceptual knowledge,

associated to the lexical/referential meaning of words, even though the task relied on structural, and hence grammatical, decisions.

Recall that the goal of this experiment was in fact to determine a baseline level of agent preference in each condition in this definition task, in contrast to the picture selection task. We now proceed to the subsequent experiments, hypothesizing that because conceptual meaning arises from what we know about the referents of words, we would be able to encourage use of structural cues to meaning by decreasing lexical/referential cues. We do so in Experiments 2b and 2c by introducing novel *-er* nominals for which adults do not already have referents.

Experiment 2b

First, in Experiment 2b, we created a second questionnaire, comprised of compound and phrasal derived *-er* nominals for which neither the agent nor the instrument are real-world people or objects. Our motivation for using these unattested nominals is to prevent interference from pre-existing dispositions of the agent or instrument. We predicted that these unattested nominals would increase the agent preference in the phrasal condition.

4.2 Methods

4.2.1 Participants

Thirty adults completed a definition task in the form of an offline questionnaire. All were native speakers of English who had not participated in the previous experiments.

4.2.2 Materials

Ten new experimental items were constructed for this questionnaire. The same two critical conditions manipulated in Questionnaire 2a were used for this experiment: a phrasal (e.g., *labeler of bottles*) vs. a compound condition (e.g., *bottle labeler*).

As in Questionnaire 2a, in addition to the experimental items, 21 filler items that also are unattested in English (e.g., *juice chair*, *data team*) were included. Again, participants saw one of two presentation lists such that they saw each target trial in either the phrasal or compound nominal form. Filler trials were interspersed.

4.2.3 Procedure

The procedure was the same as in Experiment 2a.

4.2.4 Results

Responses were coded as in Experiment 2a. Responses that indicated both agent and instrument interpretations (16 out of the total 300) as well as responses that indicated neither (26 of 300) were again similarly distributed across conditions (19 in the phrasal condition and 21 in the compound condition). Of the remaining responses, in the phrasal condition 90% showed an agent interpretation (significantly more than chance, $X^2(1) = 83.851$, $p < .0001$) while in the compound condition, 73% did so (significantly more than chance $X^2(1) = 25.290$, $p < .0001$). Performance in the two conditions differed significantly from each other (Fisher's exact test, $p < .0007$).

4.2.5 Discussion

As we predicted, in the phrasal condition, the agent preference increased, closer to the idealized 100% preference. We claim that this is because we used nominals that did not refer to existing instruments, which therefore reduced the influence of world knowledge for

conceptual dispositions. We hypothesized that we could reduce this influence still further if we used nonce words, and not just unattested nominals with real words. Therefore, in Experiment 2c, we replaced both of the content morphemes in the nominals with nonce morphemes.

In the compound condition, the agent preference also increased compared to our previous manipulations. We are not sure what to make of this – perhaps the clear preference for the agent on phrasal nominal trials influenced performance on the compound trials. In any case, our crucial predictions, that performance in the phrasal condition would approach 100%, and would differ significantly from performance in the compound condition, were realized.

Experiment 2c

In Experiment 2c, we aimed to reduce the influence of real-world conceptual knowledge still further by using nonce morphemes. We predicted that the percentage of agent responses would increase even more in the phrasal nominal condition, approaching the idealized 100% preference, but that responses in the compound nominal condition would remain similar to the baseline we established in Experiment 2a.

4.3 Methods

4.3.1 Participants

Twenty-two adults completed a definition task in the form of an offline questionnaire. All were native speakers of English who had not participated in the previous experiments.

4.3.2 Materials

As in the previous questionnaires, ten experimental items were constructed for this questionnaire. As replacing all the lexical items with invented words (e.g., *nerger of shricks*) was judged too difficult for participants, we used invented words only for the verb. The same two different conditions were tested: a phrasal (e.g., *wongler of groups*) vs. a compound condition (e.g., *group wongler*). As before, in addition to the experimental items, 21 filler items without *-er* (e.g., *book shinging*, *huppation of faxes*) were included to distract participants from the true purpose of the study. Two presentation lists were constructed so that participants would only see the experimental items in one of the two conditions.

4.3.3 Procedure

The procedure was the same as in the previous two questionnaires.

4.3.4 Results

Responses were coded as before. Responses in favor of both interpretations (22 out of 220) or neither interpretation (88 out of 220) were distributed relatively evenly across conditions (66 in the phrasal condition and 44 in the compound condition), and were excluded from analysis. Of the remaining responses, in the phrasal condition participants provided an agent interpretation 94% of the time (significantly more than chance, $X^2(1) = 58.299$, $p < .0001$) and in the compound condition, 76% of the time (significantly more than chance, $X^2(1) = 24.045$, $p < .0001$). Performance in the two conditions differed significantly from each other (Fisher's exact test, $p < .0025$).

4.3.5 Discussion

As predicted and shown in Table 3, the results for the compound condition are comparable to Experiment 2b, but in the phrasal condition, the agent preference was higher than in Experiment 2a, and even more so than in Experiment 2b. Experiments 2b and 2c show that adults approach the expected 100% preference for agents as referents of phrasal *-er* nominals as we removed more lexical content, that is, when lexical sources of world knowledge are removed (Experiments 2b and 2c).

Questionnaire	2a	2b	2c
Phrasal	79%	90%	94%
Compound	29%	73%	76%

Table 3. Percentage of agent interpretations as a function of condition for Experiment 2.

5 General discussion

The results of our experiments reveal that while adults are sensitive to the structural differences between compound and phrasal nominals, the dispositional meaning of *-er* nominals is not always solely driven by structural information. Rather, adults also have access to and use conceptual knowledge to the extent that it sometimes can override structural knowledge. We found that for adults, the more we limited the availability of conceptual knowledge, the more structural knowledge came to the forefront.

Given this interpretation of the results, some interesting questions remain. First, given that both conceptual and grammatical information can be used to constrain a subject's mental model of the situation being discussed, the question arises as to why conceptual information can sometimes apparently trump grammatical information. In linguistic theory, this result is unexpected. To understand why this happens, we propose to make use of a distinction between *automatic* and *controlled cognitive* processes (Posner & Snyder, 1975). We hypothesize that accessing conceptual knowledge is automatic, while using grammatical information with conceptual information to construct a mental model is not necessarily entirely automatic; that is, it may involve some non-automatic process. Thus, deciding whether something has a mere conceptual disposition invokes only world knowledge, but deciding whether something has an event-related grammatical disposition invokes both conceptual knowledge and structural knowledge; some controlled, and therefore slower and more cognitively costly process must be involved. It might even be speculated that the combinatorial nature of grammar is more costly than simply accessing stored knowledge by virtue of its combinatorial complexity. We are not claiming that accessing grammatical knowledge, in and of itself is non-automatic, but that combining conceptual and grammatical information to construct a mental model leads to a more costly cognitive process.

Speculations aside, note that on this account there is only one specific use of grammatical information, namely using it to constrain a mental model, that must involve a non-automatic process. So this idea does not entail that other processes involved in language processing are not generally automatic. And in fact there is independent evidence that non-automatic processes are invoked in constructing adequate mental models. For instance, when asked whether the truth of (2a) and (2b) together entail the truth of (2c), many people will say that it does (Evans, Barston, & Pollard 1983).

- (2) a. All roses are flowers.
 b. Some flowers are roses.
 c. Some roses are flowers.

However, on reflection, one constructs a mental model that includes some non-rose flowers, and it is clear that the truth of (2c) is not entailed. So evidently, it is perfectly possible to at first automatically construct a mental model that erroneously would lead one to give the wrong answer for (2). This case does differ from the *-er* nominal cases in that here it is not grammatical knowledge that is being underutilized, but rather the set-theoretical knowledge of *all* and *some*, as well as the ability to override a “closed world” assumption that roses are the only objects in the mental model being constructed. The point nonetheless remains that constructing models based on fine-grained relationships expressed by non-lexical morphology need not be automatic, fast, and easy.

In the case of *-er* nominals, we propose that matching a non-event-related disposition to a referent in the world, as one does when picking a referent for a compound *-er* nominal, is an automatic process, as it only involves conceptual knowledge. On the other hand, matching an event-related (grammatical) disposition to a referent in the world, as for phrasal *-er* nominals, is not entirely automatic. Since controlled processes are slower and have a greater cognitive cost than automatic processes, speakers may use automatic, conceptual matching instead of non-automatic, grammatical matching, in an experimental setting. If a speaker does use automatic matching for phrasal *-er* nominals, they will pick out an appropriate referent that has a mere conceptual disposition, that is, either an agent or an instrument. Some speakers seem to do exactly this, eschewing the more costly controlled process, which would constrain the referent to be animate (via the grammatical disposition, which apparently requires animacy). This would explain why we did not observe 100% agent selection by adults in the phrasal condition in Experiment 1 and 2, but nearly did in Experiment 2c where conceptual knowledge cues were essentially absent.

The fact that structural knowledge can be present (implicitly) but not used thus confounds attempts to decide whether speakers have or do not have structural knowledge, especially if the task involves some controlled processes. Methodologically, it appears crucial to distinguish grammatical and conceptual knowledge, controlling for the interference of conceptual knowledge, in order to understand what role structure may or may not play to resolve interpretational problems at the syntax-semantics interface. This point leads us to believe that it would be worthwhile to probe grammatical knowledge using measures that specifically target automatic processing to be able to better determine the extent to which adults (and children) have structural knowledge. Thus, on the basis of our results, we cannot conclude that van Hout and Bos’s previous acquisition research on this issue necessarily demonstrates that children lack the structural knowledge necessary to correctly interpret *-er* nominals and that adults are assumed to have. Rather, just as conceptual knowledge interfered with adults’ abilities to use structural knowledge, it likely does so for children as well.

Another question raised by this research is whether this account, in which conceptual information interferes with grammatical information, conflicts with a view of semantics as interpretive of syntactic structure. Our response to this question is that it does not. The semantics that is interpretive of syntactic structure is logical form, and is included in what we mean by “structural information”. The interfering semantic information is conceptual in nature; it relates to the encyclopedic content of words and their relation to the real world, i.e., to knowledge that is related to the lexicon. Just because the conceptual information

interferes with the use of logical form (i.e., structural information) does not mean that logical form is not interpretive of syntactic structure.

In this context, it is also important to note that, both Alexiadou & Schäfer's and Roy & Soare's accounts of *-er* nominals prove useful in distinguishing conceptual from grammatical information. Alexiadou & Schäfer use grammatical dispositions, for instruments as well as agents; while Roy & Soare argue that instrument dispositions are simpler than event-related agent dispositions. The theoretical difference here is what has led the present study to distinguish grammatical vs. conceptual dispositions, and by extension to investigate the relative role of grammatical and conceptual knowledge and how they may interact or not.

With this distinction in mind, it becomes clear how the judgments predicted by linguistic theories may vary from the actual results arising from the experimental settings. The goal of theoretical linguists in providing judgments is very often to exclude mere conceptual information, i.e., world knowledge, to the benefit of structural information. This is why binary judgments of the type 'grammatical' / 'ungrammatical' are in fact possible at all: in essence the linguist judges a structure as conforming to the grammar or not, and world knowledge does not intervene in deciding if a particular combination may or may not be the product of a particular grammatical system. Participants in our picture-naming tasks and questionnaires, however, may or may not distinguish structural information and grammatical information. There are different cues to the dispositional reading, but they do not necessarily separate them; they may not even be explicitly aware that there are two different sources of information.

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(Roy)

SFL (CNRS/Paris 8)

(Copley)

SFL (CNRS/Paris 8)

(Colonna)

SFL (CNRS/Paris 8)

(Arunachalam)

Boston University

A dispositional semantics for ‘can’

Barbara Vetter

Metaphysicians of modality are increasingly critical of possible-worlds talk, and increasingly happy to accept irreducibly modal properties – and in particular, irreducible dispositions – in nature. The aim of this paper is to provide the beginnings of a modal semantics which uses, instead of possible-worlds talk, the resources of such an ‘anti-Humean’ metaphysics. One central challenge to an anti-Humean view is the context-sensitivity of modal language. I show how that challenge can be met and a systematic modal semantics provided, given an independently plausible metaphysics of dispositional properties or potentialities

Keywords: Dispositions, modality, semantics, modal semantics, anti-Humean

1 Humean and anti-Humean Metaphysics

The world as I see it is a world of potentials: it consists of individual objects that have powers, dispositions, abilities, and capacities. I have the ability to write this paper, and the capacity for rational thought. The computer in front of me has the power to connect to the internet, and the cup from which I am drinking my coffee has a disposition to break if dropped on a hard surface.

On one level, there is nothing controversial in what I have just said. Everyone can agree on the truth of the sentences I wrote. Philosophical disagreement comes when we consider the underlying metaphysics in which their truth-conditions are ultimately to be formulated. I believe that these sentences wear their truth-conditions very much on their sleeves: they are true just in case (in fact, they are true because) I, my computer, and my cup have certain properties – abilities, capacities, powers, dispositions – and that’s all there is to it. The world contains irreducibly modal properties, among which are the properties just mentioned; all it takes for the ascription of such a property to an object to be true is for the object to possess the property. David Lewis, to pick an obvious opponent of my view, thinks otherwise: while all our talk of modal properties is fine, it is far from being the ultimate analysis of such statements as ‘I have the ability to write this paper’. Ultimately, what is needed in such an analysis is reference to possible worlds: my having an ability to write this paper amounts to nothing more than my or my counterparts’, in some relevant possible worlds, doing just that: writing (a counterpart of) this paper.

The world (the actual world, which we inhabit), for Lewis and his followers, is modally empty: it contains ‘a vast mosaic of local matters of particular fact, just one little thing and then another. ... we have an arrangement of qualities. And that is all.’ (Lewis 1986:ix f.) Modality,

This paper is a reprint of my “‘Can’ without possible worlds: semantics for anti-Humeans”, which appeared in *Philosophers’ Imprint*, vol. 13, no. 16, in August 2013. The paper has been written for a philosophical audience, but I hope that it will be of interest to linguists as well. Further developments of the ideas of this paper are in my Vetter 2015:ch.6. I would like to thank the organizers and participants of the Stuttgart conference on dispositions, especially Fabienne Martin and Tillmann Pross, for invaluable discussions. For helpful earlier comments on this paper, I am grateful to two anonymous referees for *Philosophers’ Imprint*, Mathias Böhm, Catharine Diehl, Antony Eagle, Romy Jaster, John Maier and Timothy Williamson; participants at the 2009 *Phloxshop II: Modality* in Berlin and at the 2011 *Abilities, Agency, Freedom* workshop in Berlin; and the participants of Thomas Krödel’s and my joint graduate seminar on ‘Recent Work in Theoretical Philosophy’ at Humboldt-Universität, Berlin.

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for Lewis and Lewisians, has to come from outside that mosaic if it is to be real: it has to be outsourced to other possible worlds. Following Lewis, this thesis has come to be known by the name ‘Humean supervenience’, and its adherents as Humeans.

My own view is anti-Humean: I believe that this, the actual, world abounds in modality, or more precisely: in modal properties possessed by individual objects. I have no need to outsource modality to other possible worlds. In recent years, the anti-Humean view has found an increasing number of defenders coming from the philosophy of science.¹ The metaphysics of science thus joins forces with a more traditional Aristotelian outlook in rehabilitating a metaphysics that is, on the one hand, deeply engrained in our ordinary, everyday view of ourselves and the world around us, and which provides, on the other hand, a better understanding of the natural sciences.

Lewis’s own stated motivation for Humean supervenience was ‘to resist philosophical arguments that there are more things in heaven and earth than physics has dreamt of’ (Lewis 1994:474), but it is precisely this naturalistic motivation that has come under attack. As Maudlin 2007 has argued, contemporary physics itself provides cogent arguments that there is more, in both heavens and earth, than Humean supervenience has dreamt of. Moreover, the Humean herself seems committed to more than physics has dreamt of, namely, purely qualitative properties or ‘quiddities’ with no dispositional profile. The assumption of such quiddities has little basis in scientific practice; science, as Simon Blackburn has put it, ‘finds only dispositional properties all the way down’ (Blackburn 1990:63²).

Given this motivation, it should not come as a surprise that anti-Humeanism has proved quite fruitful in the metaphysics of science. Its most pronounced proponents in recent years have been ‘dispositional essentialists’³, who hold that the laws of nature are grounded in the essentially dispositional properties of the fundamental physical objects. Anti-Humeans have also begun to put dispositional properties or ‘powers’ to use, for instance, in thoroughly actualist theories of modality⁴ and dispositional theories of causation⁵.

These anti-Humeans have in common that, rather than reducing dispositions or explaining them in terms of something else, they try to explain a variety of other phenomena in terms of dispositions. They may appeal, for heuristic purposes, to such notions as that of necessity or of a possible world – thus, the dispositional essentialists are prone to say that fundamental properties have their dispositional profile necessarily, or in every possible world. But at bottom, their metaphysics is not going to contain possible worlds or irreducible necessities. It contains, rather, irreducible dispositions.⁶ (The metaphysics of irreducible dispositions will be spelled out in some more detail in section 3.)

I am not going to discuss the merits of the various anti-Humean projects in metaphysics here. Instead, I am going to focus on an area that is as yet unexplored in the growing anti-Humean literature: the semantics of natural language. I have said that in accepting such modal properties as dispositions or powers, the metaphysics of science joins forces with a more everyday view

¹They include Bird 2007, Molnar 2003, Ellis 2001, and Cartwright 1989, to name but a few.

²See also Molnar 2003 and Bird 2007.

³Prominently, Ellis 2001 and Bird 2007.

⁴Proponents include Borghini and Williams 2008, Jacobs 2010, Contessa 2009; see also Vetter 2011.

⁵See Mumford and Anjum 2011, Bird 2010.

⁶The claim is not that every disposition is irreducible. A glass’s fragility, for instance, can presumably be reduced to properties of the glass’s constituents and relations between them. The claim is that the basis of this reduction will itself be dispositional. What is claimed to be irreducible is not this or that particular disposition, but dispositionality itself.

of ourselves and the world as deeply modal, or as Goodman (1954) put it, 'full of threats and promises', possessing a variety of abilities, powers, capacities and dispositions. Our everyday view is expressed in everyday language, which contains an abundance of modal expressions such as 'can' and 'would', 'possibly' and 'necessarily', and various other expressions. One of the major achievements of the apparatus of possible worlds is its success in the semantics of such modal expressions. If the anti-Humean is to do without such tools as possible worlds, she will do well to develop a modal semantics of her own, linking everyday statements of a modal character to what she takes to be the fundamental modal character of the world: the modal properties of individual objects.

The aim of this paper is to take the first steps towards such an anti-Humean modal semantics. My aim is constructive, not destructive. I do not aim to refute possible-worlds semantics, or any other candidate modal semantics (whatever that would mean). Rather, I want to show what can be done if we allow ourselves the very different resources of an anti-Humean metaphysics. Section 2 prepares the ground by delineating the scope of the theory and its main challenge. I argue that the most congenial starting point for an anti-Humean semantics is what linguists often call 'dynamic' modality, and in particular the modal auxiliary 'can'; and that its most formidable challenge is to provide the materials for the well-known flexibility and context-sensitivity of 'can' (and, in a second step, of other modal expressions). Section 3 examines the anti-Humean metaphysics in more detail to show that it provides the materials required to meet the challenge. Sections 4-5 present the core of the semantic account: it specifies the truth-conditions for 'can' statements and an account of their context-sensitivity (4), and subsequently extends them to other expressions of dynamic modality (5). Section 6 briefly discusses further issues that arise in spelling out the semantics that I present: the relation between *de re* and *de dicto* modality, and the relation between the different types of modality. My aim is to present the view, not to argue for its superiority. Its chief attraction lies in linking our modal language to the modal reality which, according to anti-Humean metaphysics, it must be about.

2 Setting the stage

Before we begin to formulate the semantics, we should get a clearer view of its target. Modal language is a ubiquitous and variegated phenomenon; to make it tractable, we need to define the scope of our theory and set out its main *explanandum*.

2.1 The scope

Modality is a many-headed beast. Where should an anti-Humean semantics begin? I hold that the best starting point is *dynamic possibility*, and in particular, the modal auxiliary 'can'. My reasons for starting here are pragmatic: it is the starting point that best suits the anti-Humean metaphysics. I will explain why this is so in three steps: first, explaining why the semantics should focus on *dynamic* modality; second, explaining why it should focus on a modal auxiliary rather than, say, the adverb 'possibly'; and third, explaining why it should focus, among the modal auxiliaries, on 'can' rather than, say, 'would' as it occurs in counterfactual conditionals.

Why choose a starting point at all? Should we not try to cover all of linguistic modality at once? As we shall see at the very end of the paper, the anti-Humean semanticist has reason to believe that not all of linguistic modality is of one kind. Linguistic modality, on the approach advocated here, is a complex and semantically heterogeneous phenomenon, which has to be understood in a piecemeal fashion. So let us begin by isolating the best starting point for this

piecemeal approach.

First, why dynamic modality?

Linguistic modality is standardly partitioned into epistemic, deontic, and dynamic.⁷ Roughly, epistemic modality is about what is compatible (or not) with our knowledge, deontic modality is about permission and obligation, and dynamic modality – or ‘circumstantial modality’, as it is sometimes called – is about developments that are open (or not) given how things really are. Let me briefly illustrate these three types of modality with three typical examples.

First example: a detective reviews the inconclusive evidence in a murder case and says ‘John might be the murderer’. The detective expresses an epistemic possibility of John’s being the murderer; it is compatible with the detective’s evidence that John is the murderer. Second example: a mother tells her son ‘you may go out and play now’. ‘May’ here, as often, expresses deontic possibility: the son is permitted to go out and play. Third example: a botanist analyses the soil in a foreign country, thinking about which plants to import. She informs her colleague ‘Hydrangeas can grow on this soil’, thus expressing that given the circumstances there is a real possibility of hydrangeas growing on the local soil, even though she is fully aware that no hydrangeas are growing on it now. This is a dynamic or circumstantial possibility.

The natural province of the anti-Humean semanticist is dynamic modality. Dynamic modality arises from how things actually are, and this is precisely where the anti-Humean wants to locate the modal properties of her metaphysics. Epistemic modality concerns our knowledge of things, with which the anti-Humean semantics has no special connection. Deontic modality, finally, requires an element of normativity that the metaphysics, so far, is in no shape to offer. This is not to deny that the anti-Humean semantics might eventually be extended to cover deontic and epistemic modality as well; I will sketch some options for doing so at the end of this paper. But a natural place to start is dynamic modality.

Second, why a modal auxiliary?

I am going to focus on a modal auxiliary, rather than on the philosopher’s preferred idioms ‘possibly’, ‘necessarily’, ‘it is possible/necessary that ...’. One very simple reason for this is that I will be concerned with the semantics of ordinary language, and it is the modal auxiliaries that dominate our ordinary modal discourse. (They have also been the subject of a number of systematic empirical inquiries, on which I shall draw occasionally⁸.) Like Mondadori and Morton (1976), I think this is reason enough to focus on the ‘studier laboring class of idioms’ (Mondadori and Morton 1976:237) that are the modal auxiliaries.

But there is a more systematic reason for this focus. Modal adverbs and adjectives of the kind that is wide-spread in philosophical discourse do not express dynamic modality in ordinary English. They are typically used to express epistemic modality. Sentence-adverbs such as ‘possibly’ and sentence-modifying constructions such as ‘It is possible that’ are used, outside the philosopher’s vernacular, to express that something is compatible with what we know.⁹ Dynamic modality is expressed primarily by modal verbs and auxiliaries, such as ‘can’ and ‘be able to’. Syntactically, these expressions function not as sentence modifiers but as predicate modifiers. To form a declarative sentence, they require a noun phrase and a verb phrase. Sentence-modifying

⁷See Kratzer 1991, Palmer 1990, Collins 2009.

⁸Coates 1983 and Collins 2009 report the results of corpus-linguistic surveys on the English modals; Palmer 1990, as well as Palmer 1974 and Palmer 2001, provides helpful overviews.

⁹Or, perhaps, what we could easily come to know (as argued in DeRose 1991). See also Kratzer 1981, who observes the same pattern in the case of German: ‘Sentence adverbs like *wahrscheinlich* or *möglicherweise* [‘perhaps’ and ‘possibly’] always express epistemic modality – if they express modality at all.’ (Kratzer 1981:56)

adjectives such as 'possibly', on the other hand, require a complete sentence of any form. Where an expression such as 'possible' is used to express dynamic rather than epistemic possibility, it tends to have predicate-modifier structure as well, as in the construction 'it is possible for ... to ...'.

Compare the following four sentences (the example is Keith DeRose's):

- (1) a. It is possible that Frank runs four-minute miles.
 b. Possibly, Frank runs four-minute miles.
 c. It is possible for Frank to run four-minute miles.
 d. Frank can run four-minute miles.

(1-a)

and (1-b) express an *epistemic* possibility of Frank's running a four-minute mile, while (1-c) and (1-d) express a *dynamic* possibility. As DeRose (1991) points out, when Frank's new friends begin to suspect that he is a track star, they may truly and adequately utter (1-a) or (1-b) even though Frank in fact, and unbeknownst to them, is quite incapable of running a four-minute mile ('his only event is throwing the javelin', DeRose 1991:602). But given Frank's incapability to run four-minute miles, (1-c) is false. Conversely, (1-c) and (1-d) may be adequately asserted by someone who knows that Frank has never run a four-minute mile, judging merely from the constitution of his legs, lungs etc. (1-a) and (1-b), on the other hand, are not adequately asserted by a subject who *knows* that Frank does not actually run four-minute miles.

The contrast between sentence-modifying adverbs or adjectives and predicate-modifying verbs or auxiliaries has double impact for our purposes. First, it supports the exclusion of those adverbs and adjectives from an account that is, as we have seen, aiming to account for dynamic modality. Second, it provides further motivation for the anti-Humean to focus on dynamic, rather than epistemic, modality. For the predicate-modifying expressions are naturally construed as ascribing to the sentence's subject (Frank, in (1-c) and (1-d)) a modal property appropriately related to the property expressed by the verb phrase (in our examples, the ability to run a four-minute mile). Sentence-modifying expressions, on the other hand, are best construed as ascribing a certain status to the propositions expressed by the sentences in their scope (e.g., the proposition that Frank runs four-minute miles). But it is precisely the ascription of modal properties that an anti-Humean semantics should take as basic in its modal semantics: after all, modal properties such as dispositions, powers, or potentials, are precisely what the anti-Humean metaphysics has to offer.¹⁰

Third, why 'can'?

'Can' is one of the most common modal auxiliaries, matched only by 'would'¹¹. It is, moreover, the modal that is most closely associated with dynamic modality. According to a recent corpus survey, 'can' was used dynamically in 81% of its occurrences throughout a large cor-

¹⁰The contrast as I have drawn it is a syntactic one. The anti-Humean semantics argues that it is also a semantic one. The syntactic contrast only takes us so far. Some modal auxiliaries, which syntactically function as predicate modifiers, express epistemic modality – 'might' is a case in point. Conversely, a semantics that treats modal expressions uniformly as sentence modifiers – such as standard possible-worlds semantics – may argue that the semantic structure of dynamic modals differs from their syntactic surface structure. I cannot pursue this question in any more detail here. See, however, Brennan (1993), who provides genuinely linguistic evidence that the contrast is a semantic one, and that all dynamic modality ascribes modal properties to individuals.

¹¹Collins 2009:5.

pus.¹² It has a deontic reading ('Can I go now?') and, especially in its negated form, an epistemic reading ('This cannot be true!'), but those are the minority of cases. Other modals, such as 'may', 'might', or 'must', are primarily deontic or epistemic. So, if the anti-Humean semanticist wishes to focus on dynamic modality, 'can' is the paradigmatic case.

To those familiar with the literature on dispositions, the focus on 'can' may still come as a surprise. Dispositions are generally held to be closely connected to counterfactual conditionals. Thus a fragile glass is one that would break if it were struck or dropped, an irascible person is one who would get angry if provoked, and the fundamental dispositions – take electric charge as an imperfect approximation – are dispositions to respond in a lawful way to certain circumstances: for instance, to attract positively charged particles when in their vicinity. So why not start with these counterfactual conditionals, and give their semantics in terms of the dispositional properties which – on the anti-Humean view – are their grounds or truthmakers?

The problem with this approach has been noted by Eagle (2009). The possession of a disposition by some relevant object is neither necessary nor sufficient for the truth of a corresponding counterfactual conditional. It is not sufficient because the disposition may be masked: pack a fragile glass in styrofoam, and it is no longer true that it would break if struck; sedate an irascible person with a drug, and it is not true that she would get angry if provoked; place another particle close to the electrically charged particle, and it may no longer be the case that it would attract a positively charged particle if that particle were to come into its vicinity. Nor is a disposition necessary for the truth of the conditional, for conditionals can be mimicked: place a non-fragile block of concrete at the edge of a windowsill on the 50th floor, and it would break if struck (because it would fall down to the street 50 floors below); let a good-tempered person go without sleep for three nights, and it may well be true that she would get angry if provoked; place a sufficient number of electrons close to a positively charged particle *p*, and it is true that another positively charged particle would be attracted if it were in *p*'s vicinity. In general, it appears that while a disposition is typically an intrinsic and relatively durable property of an individual, the truth of a counterfactual conditional is highly sensitive both to matters extrinsic to the object in question, and to its momentary condition.¹³

Dispositionalists themselves have used such counter-examples to resist a reductive account of dispositions in terms of conditionals (starting with Martin 1994); but the same problems frustrate their own efforts at a reduction or explanation that goes in the opposite direction. In fact, the Humean is in a better position since she can produce a more complex conditional that does capture the disposition. The anti-Humean, if she wants to come up with a semantics for counterfactual conditionals, should not make the same move: after all, the semantics is meant to apply to all counterfactual conditionals, or else it is of little use.

I will suggest a solution to this problem later in the paper. In the meantime, it seems, again, that a better place to start is 'can'. Unlike the counterfactual conditional, 'can' has a well-established use in which it ascribes to individuals relatively intrinsic and durable modal properties: abilities. In saying 'Sally can play the piano' or 'Linda can run a mile in five minutes', we

¹²Collins 2009:98. In contrast, 'may' was used dynamically in only 8.1%, 'must' in 6.3 %, and 'would' in 22.9 % of occurrences (Collins 2009:pp. 34, 92, 140).

¹³Further, it is not so obvious that conditionals *do* provide the best parallel to dispositions. As Manley and Wasserman (2008) have noted, the idea that each disposition has a stimulus condition corresponding to the antecedent of a conditional 'is plausible only given a paltry diet of examples' (Manley and Wasserman 2008:72). I have argued elsewhere that dispositions are closer to statements of possibility than to counterfactual conditionals (Vetter 2013, Vetter 2014).

are most naturally understood to ascribe to Sally or Linda an intrinsic property, which is acquired and sustained by practice and exercise. Abilities of this kind are modal, and they are intrinsic properties of the individuals concerned – they are just the kind of property in terms of which the anti-Humean semantics is to be framed. Thus the modal auxiliary 'can' is more congenial to the anti-Humean semantics from the start.

In section 4, therefore, I will start by outlining in some detail the semantics of 'can'. Other expressions of dynamic modality will be treated more briefly, and mostly by reference to the paradigmatic case of 'can'. I have given some pragmatic, and some linguistic reasons for preferring 'can' as a starting point. None of these considerations is decisive, but they should be sufficient to motivate the approach that I am recommending. The proof, as so often, is in the details.

2.2 *The challenge*

The modal auxiliary 'can', I have said, is a congenial starting point for anti-Humean semanticists, due to its ability-ascribing uses. This observation leads directly to a first challenge. 'Can' is used, not only to ascribe an ability ('I can play the piano'), but also to express that an ability is possessed and conditions are suitable for its exercise ('You can buy a kettle in that store'), or just that there is a possibility of something coming about ('You can fall off the cliff if you're not careful').

The anti-Humean approach to semantics, while tailor-made for the ability uses, appears by the same token to be ill-equipped to account for most others. While 'I can play the piano' plausibly ascribes to its subject (the speaker) an intrinsic modal property, the other two sentences and myriads like them do not. How is the anti-Humean semantics to account for such sentences?

Moreover, not only do different sentences with 'can' express different things. One and the same sentence can express all these different things in different contexts. Is it true to say of me, right now, that I can swim? Yes and no. Yes: I have learned to swim, my muscles are in working order, of course I can swim. Then again, no: there is no body of swimmable water anywhere near me. How should I swim if there's no water? Clearly, I cannot swim. Or suppose that I am celebrating my birthday on the beach and have had one glass of wine too many. Can I swim? Yes and no. Yes: not only have I learned to swim, but there is plenty of water around for me to swim in. Then again, no: given the amount of wine I have had, I would certainly drown if attempting to swim here and now, so I cannot swim.

The same sentence ('I can swim'), applied to the same situation, may with equal right be either affirmed or denied, held true or false. This is witness to the fact that 'can' is context-sensitive: it is used to express different things in different contexts. We have shifted the context of assertion by focussing, first, on my muscles etc., and second on the availability of swimmable water; or in the second case, by first focussing on my training and the opportunity to exercise it, and second, on my temporary state of inebriation. Some of these aspects appear to be a matter of my intrinsic abilities, but others concern matters that are extrinsic to me (such as the presence or absence of water in the vicinity) or too temporary to count towards or against my abilities (such as the fact that I have had too much wine). If the semantics offered by anti-Humeans has only intrinsic modal properties such as my abilities at its disposal, it will fail to account for the latter two kinds of aspects. And if it fails to account for them, then *a fortiori* it will fail to account for the context-sensitive variation regarding which of these aspects are relevant.

According to the anti-Humean metaphysics, modal properties such as dispositions and abil-

ities are real properties of individuals. They themselves cannot, therefore, be context-sensitive: context-sensitivity is a matter of language, not the world. So what happens when the same sentence, applied to the same situation, seems to change its truth-conditions from one context to another? In general, such contextual variations are modelled against the background of something that is not itself subject to such variation. Contexts supply criteria for relevance, and it is only the relevant parts of the background that go into the truth-conditions of the sentence as uttered in a context. The anti-Humean semantics, if it is to follow this general strategy, must supply a sufficiently rich background against which contextual variation can take place. Abilities alone cannot do the job.

‘Can’, of course, is not a special case; our modal language is context-sensitive through and through.¹⁴ If we develop an account for ‘can’, it must be applicable to other cases as well.

Indeed, this is precisely where the standard, possible-worlds based approach to modal semantics gets its force: it offers an elegant and unified account of the shifting and context-sensitive meaning of modal expressions. A sentence ‘S can Φ ’, in possible-worlds semantics, says that S (or S’s counterpart) Φ s in some possible world where certain contextually selected facts hold. Different contexts select different facts: in its ability-ascribing use, ‘I can swim’ says that I swim in a possible world that holds fixed certain intrinsic features of me; in its ability-plus-opportunity use, it says that I swim in a possible world that holds fixed those same features plus certain aspects of my environment, such as the fact that I am not near any swimmable body of water; and so on. If the anti-Humean semantics is to be a serious competitor, it has to find some way of matching the flexibility of possible-worlds semantics.

We have set a challenge to the anti-Humean semantics we are about to formulate. The semantics has to provide the materials for the opportunity- or possibility-expressing sentences, and generally for non-ability-ascribing sentences with ‘can’, to come out true. In addition, those materials must be suited to explain the context-sensitivity of sentences such as ‘I can swim’; it must be such as to make sense of our focussing on one kind of truth-conditions in one context, and on a different kind in another context.

I hold that the anti-Humean metaphysics, once it is spelled out in sufficient detail, has all the resources to answer this challenge. The next section will be devoted to providing those details. Section 4-5 will then put them to use in formulating, first, a semantics for the dynamic ‘can’ (4); and second, applying the insights gained from this paradigmatic case to give sketch of the semantics for other modal expressions, such as ‘could’, ‘might’ and ‘would’ where they are used dynamically (5). For the reasons given above, I will focus on *dynamic* uses of those words, excluding epistemic and deontic ones. This exclusive approach will be explicitly addressed again only once the semantics is formulated, in section 6.

But first, the metaphysics.

3 The metaphysics of potentiality: Three observations

The anti-Humean metaphysics sketched in section 1 affords the materials for modal semantics; but it needs to be worked out in considerably more detail. The aim of this section is to provide those details. I will develop the metaphysics at an intuitive level, beginning with the familiar examples of dispositions and abilities that we started with, and gradually generalizing from them

¹⁴For a classic exposition, see Kratzer 1977.

to highlight certain general features of potentiality on the anti-Humean framework.¹⁵

Objects, I have said earlier, have a host of modal properties: dispositions, abilities, capacities, powers, tendencies, propensities, and so forth. I see no point, at the moment, in trying to draw sharp distinctions between these kinds of modal properties. Rather, I trust that we can all agree that these kinds of modal properties, if they differ from each other at all, are species of a common genus. I call that genus *potentiality*, so as to have a name for it. As potentiality is going to be my metaphysical primitive, I shall give no reductive definition of it. It has been introduced by example. It can be introduced by analogy too, though the analogy is of a purely heuristic value: potentiality is to possibility as essence, on a prominent contemporary position, is to necessity. The contemporary position I have in mind is Kit Fine's: Fine (1994) has argued that essence does not reduce to necessity, and suggested instead that necessity rests on essence. The important point for my analogy is that essence, unlike necessity, is always bound to one or more particular objects: it is the essence *of* a particular object to be so-and-so, while a necessity is simply a necessity that Similarly, a potentiality is always the potentiality (the power, capacity, disposition, etc.) *of* a particular object to do so-and-so, while a possibility is simply the possibility that Possibility and necessity attach to whole states of affairs (or propositions, or sentences) regardless of their finer structure; potentiality and essence attach to, or relate, an object and a property.

I will now offer three observations about potentiality, which are based on the examples I have given in introducing the term and will prove crucial for the semantics.

3.1 First observation: Potentialities come in degrees.

Most glasses are fragile, but a delicate champagne glass is more fragile than an ordinary tumbler. Gasolene is more flammable than vegetable oil. An object's mass, which many philosophers think of as a disposition, can be greater or lesser. Some of us have the ability to play the piano to a greater degree than others. In general, rational capacities and practical skills can not only be acquired, but also improved with practice: that's why we take maths or piano lessons, even long after we have achieved the capacity to calculate a differential or the ability to play the piano. Likewise, tendencies towards certain behaviour can be strengthened or weakened by behavioural therapy, or by self-education.

Noting that potentialities come in degrees, we can also see that there are more potentialities than we would normally name. Take fragility. A champagne glass is more fragile than a tumbler, the tumbler in turn is more fragile than, say, a plant pot; the plant-pot is more fragile than my desk. We can go on: the desk is more fragile than a rock, the rock more fragile than a chunk of diamond. But surely, a chunk of diamond is not fragile? And come to think of it, neither is the rock or my desk, or at least we would not call it so in an ordinary context.

This illustrates two points. First, what counts as fragile depends on context. Under normal circumstances, we may be just about still prepared to call a plant-pot fragile, but not my desk. Move my desk to a building site, and it becomes much more plausible to call it 'fragile'. Second, the background for this variation over contexts is a spectrum from the more to the less fragile things on which we can order the champagne glass, the tumbler, the plant pot, etc. in descending order of their degree of fragility; and this spectrum goes well beyond the range of things which we would be prepared to call 'fragile' in any easily conceivable context, as is witnessed by the chunk

¹⁵Note that I am not here concerned with arguing for the superiority of this metaphysics as compared to, say, Lewisian modal realism. My concern is merely to develop the anti-Humean semantics in a way that will provide the materials for a viable semantics, but is plausible – by the anti-Humean's lights – independently of such a semantics.

of diamond at the very bottom of the line. Given that spectrum, a particular context can operate for ‘fragile’ as it does, for instance, for ‘tall’: by setting a threshold such that everything above that threshold counts as fragile (in the context at issue) but nothing below it does. Reserving the term ‘fragile’ for this context-dependent property, I would like to call that which all things on the spectrum have in common, and by whose degrees they are ordered, their potentiality to break. (Compare: in the case of ‘tall’, that which all things on the spectrum have in common, and by whose magnitude they are ordered, is height.) I shall later suggest that a similar mechanism is at work in the semantics of ‘can’.

3.2 *Second observation: Potentialities may be intrinsic or extrinsic.*

While it had long been assumed in the debate about dispositions that all dispositions were intrinsic properties, McKittrick (2003) has successfully challenged that assumption. McKittrick adduces a list of intuitive cases that we would classify as dispositional properties, but the possession of which depends on circumstances extrinsic to the object possessing the property. Her examples include vulnerability (a city may become less vulnerable to attacks, without changing intrinsically, when it is surrounded by a defense system), a key’s power to open a particular door (which the key possesses only so long as the door, an entirely distinct object, exists and has a lock of a particular shape), and weight (which, unlike mass, depends on the gravitational field in which an object is situated).

It is safe to assume that the same kinds of example can be construed for other kinds of potentiality. In the case of ability, the intrinsic/extrinsic distinction is similar to, though not entirely coextensive with, the well-known distinction between general and specific abilities. I may have the general ability to swim, but if I am tied to a chair 100 miles away from the nearest swimmable body of water, I lack the specific ability to swim. In this case, the general/specific distinction aligns nicely with the intrinsic/extrinsic distinction: being tied to a chair and being far away from the nearest body of water are external conditions that affect my ability to swim *as things stand*, but intrinsically I am no less able to swim. Suppose, however, that I have the general ability to swim but am drugged or drunk so that I would perform pathetically to the point of drowning if I were to be immersed in a body of water. If we ascribe to me, in this situation, the general but not the specific ability to swim, this distinction does not align with the intrinsic/extrinsic distinction. I will say more in a moment about how to understand such cases. First, let me return to the easier cases of extrinsic vs. intrinsic potentiality.

How does an object come by its extrinsic potentialities? Here’s a very simple picture. It comes in two steps.

Step 1: objects can have potentialities jointly. You and I both have the ability to see; together, we have the ability to see each other. A fragile glass, when wrapped in styrofoam, is still fragile, i.e. disposed to break; but the glass and styrofoam together are not disposed to break, nor are they disposed to be such that one of them, say the glass, breaks. There are two kinds of jointly possessed potentiality here. One has as its manifestation a relation between all of the potentiality’s possessors: such is your and my potentiality to see each other. The other kind has as its manifestation a property possessed by only some of the potentiality’s possessors: such is the glass-cum-styrofoam’s potentiality to be such that the glass breaks.¹⁶ Both kinds of jointly

¹⁶The two cases also contrast in that the first, but not the second, involves what C.B. Martin has called ‘dispositional partners’. You and I are dispositional partners – or ability partners – in that we provide for each other an opportunity for the exercise of the abilities in question. The glass and styrofoam are not dispositional partners; the

possessed potentiality can be understood in parallelism to the potentialities of complex objects. Take a biological organism, such as ourselves. We have parts – organs, bones, muscles, etc. – which have their own potentialities. Put them together just so, and their potentialities ‘combine’ (I wish I knew how to cash out that metaphor!) to yield potentialities of the whole: the potentiality to walk, to metabolise, or to raise one’s hand. Some of these potentialities have manifestations that concern the entire organism: such, it would seem, is the ability to metabolise. Some have manifestations that concern only part of the organism: such is the potentiality to raise one’s left hand. To be sure, a biological organism is a much more closely-knit whole than a glass wrapped by a piece of styrofoam. But the principal model appears to be the same.

Step 2: jointly possessed potentialities give rise to extrinsic potentialities. Jointly possessing a potentiality is one relation in which objects can stand to each other. Relations generally give rise to extrinsic properties: if you and I stand 2m apart, that relation gives rise to my possessing the extrinsic property of being 2m from you. I do not know exactly what the metaphysics of that ‘giving rise to’ is. But as the example illustrates, it is something which, one way or another, we need to have in a metaphysics of extrinsic properties anyway. It is not a special need of the anti-Humean metaphysics of potentiality. Now I want to utilize it to give a metaphysics of extrinsic potentialities: by virtue of having, jointly with you, the potentiality to see each other, I have an extrinsic potentiality to see-and-be-seen-by you. By virtue of the glass and the styrofoam together not being disposed (or only very slightly disposed) to be such that the glass breaks, the glass is not, or only very slightly, *extrinsically* disposed to break; its intrinsic disposition to break remains, however, unaffected by this.

With this picture in hand, we can generalize beyond the intrinsic/extrinsic distinction. We have the following picture: objects come together, each equipped with its own potentialities; given those potentialities and the objects’ relations, the whole will have certain potentialities of its own. The same picture, however, can be applied within any of the objects, at least given a certain level of complexity. Remember the drunk swimmer: she is equipped with an ability to swim, but her drinking has also induced certain more temporary dispositions, such as the disposition to get disoriented and erratic in her movements. Perhaps, indeed very plausibly, these different potentialities belong to different parts of the individual. But we may think of her simply as a locus of various potentials, which combine, much like the component forces of physics, to yield the ‘resultant force’ or overall potentialities of the individual. This suggests that the ‘intrinsic’ part of our intrinsic/extrinsic distinctions was over-simplified: there are finer structures of potentiality within the intrinsic makeup of most objects.

The same goes for the ‘extrinsic’ part of the distinction. Suppose I raised my arm. Did I have an ability not to raise my arm? Plausibly, I possess the general ability to not raise my arm; very likely, I also have an overall (intrinsic) ability not to raise my arm, since no disposition that is intrinsic to me prevents me from not raising my arm. Did I have an extrinsic ability not to raise my arm? That depends: which jointly possessed potentiality is to ground the extrinsic potentiality at issue? If it is just potentialities that I possess jointly with everyone and everything in this room, and if no one in this room was intrinsically necessitated to make me raise my arm, then I did have the extrinsic ability not to raise my arm. But we may think bigger. In particular, we may wonder whether I had an extrinsic ability not to raise my arm grounded in my joint potentialities with *everything else*; could I have not raised my arm, given the way the world is as a whole? That is (one version of) the question of determinism, and nothing in my metaphysical story answers

styrofoam detracts from, rather than providing an opportunity for the exercise of, the glass’s disposition to break.

it. The important point is that extrinsicality comes, as it were, in degrees: the possession of an extrinsic potentiality may depend on more or less of the world surrounding the object in question.

It appears, then, that we have another spectrum: from the most finely-grained potentialities of individual objects through their overall (normally so-called) intrinsic potentialities, to the extrinsic potentialities arising from their joint potentialities with bigger and bigger parts of the world. Let us call this the spectrum from fine-grained (intrinsic) potentialities to the coarse-grained (extrinsic) potentialities. Granularity is a matter of degree, with a minimum and maximum value. The picture remains the same: starting with the individual, fine-grained potentialities as our ‘component forces’, we build up more and more complex combinations yielding ‘resultant forces’. The picture fits well with the anti-Humean metaphysics I have introduced in section 1.

3.3 Third observation: Potentialities change over time.

Potentialities are lost and gained: I once had the potential to be a child prodigy, but having grown up I have sadly lost that potentiality without ever realizing it. When the internet was introduced over 20 years ago, humans gained the ability to communicate by e-mail. When an apple turns from green to red, it loses the disposition to cause sensations of green in normal human observers, while gaining the disposition to cause sensations of red.

But change in potentialities is not restricted to gaining and losing them. The degree to which a potentiality is possessed may increase or decrease. Thus by practising the piano we increase our ability to play it; if we neglect to practise, or (more drastically) lose a finger, that ability is decreased in degree. In educating children or ourselves, we aim to increase the degree of some dispositions – such as the disposition to tell the truth or feel empathy – while effecting a decrease in the degree of others – such as the disposition to act rashly or egoistically.

Extrinsic potentialities, too, are subject to change. McKittrick’s city becomes more vulnerable when the defence system ceases to operate, a key may lose its disposition to open a door when the door has its lock changed, the vase’s extrinsic disposition to break is decreased in degree when it is wrapped in styrofoam, and increased again when it is unpacked; and so on.

In fact, as a general rule, the more coarse-grained a potentiality, the more likely it is to change. For first, anything that leads to a change in an object’s intrinsic or more fine-grained potentialities will affect the more extrinsic or coarse-grained potentialities as well, but many factors that affect the coarse-grained potentiality have no effect on the more fine-grained one. The more coarse-grained a potentiality is, the more numerous and diverse are (typically) the factors on which it depends. Second, the external factors that affect only the more coarse-grained extrinsic potentialities are typically less stable than the intrinsic factors that affect both types of potentialities. It is easier to pack or unpack a glass than to change its internal structure; the former affects its extrinsic disposition, but only the latter would affect its intrinsic disposition to break. My intrinsic (‘general’) ability to swim remains the same, whether or not I am near a swimmable body of water; my extrinsic (‘specific’) ability to swim is easily increased in degree by taking me to a lake, and decreased again by my going back into town.

In general, the extrinsic circumstances of an object – its position in space and time, its external relations to other objects – are typically more changeable than its intrinsic make-up – the constitution of the vase’s materials, or the constitution of a swimmer’s brain and muscles. Cambridge change is easier to come by than real change. Typically, not necessarily: a caterpillar about to transform into a butterfly is likely to undergo an intrinsic change that is more radical than most Cambridge changes which may befall it in the same period of time. But typically things are

the other way around.

Because they are subject to change, both the possession and the degree of a potentiality must be specified relative to a time. Objects do not have their potentialities timelessly; they have them at a time. It is important, however, to distinguish this relativity to times from another way in which times can enter into the specification of a potentiality: by modifying its *manifestation*, rather than the potentiality ascription itself.

Being a moderately skilled typist, I have the ability to type one page in two minutes. Some people have the ability to run a mile in 4 minutes, though I do not. Some radium atoms have a disposition to decay within five years. In these cases, a time *interval* is part of the potentiality's manifestation. In one sense, these potentialities are more specific than the potentialities to type, to run, or to decay *simpliciter*. But they are not 'specific abilities' in the sense outlined earlier. Specific abilities are *coarse-grained* or extrinsic abilities; they are abilities whose possession depends on objects other than their possessor. My ability to type a page in two minutes, on the other hand, is an intrinsic or general ability. What is specific about it is not the possession conditions but the manifestation.

The temporal specifications in the previous paragraph concerned intervals, and were perfectly compatible with the potentiality itself being intrinsic. Other temporal specifications can be made sense of only in the context of extrinsic potentiality. Given that I am now sitting, unimpeded, in front of a functioning computer, and given my intrinsic ability to type a page in 2 minutes, I now possess the extrinsic ability to type a page within *the next 2 minutes*. Supposing that Frank has the ability to run a four-minute mile, and given that he is now situated, unimpeded, at a distance of one mile from the finishing line, Frank now has the extrinsic ability to reach the finishing line within *the next four minutes*. Further, if it is now 4.00pm, then we may redescribe Frank's extrinsic ability as an ability to reach the finishing line *by 4.04pm*. That description, to be sure, ceases to be adequate within a few seconds if Frank does not start running. But at 4.00pm, it seems fine.¹⁷

Potentialities come in degrees; they may be intrinsic or extrinsic; and they change over time. With these observations in hand, we can now proceed to the formulation of a potentiality-based semantics for modal language.

4 Modal semantics with potentiality: the paradigmatic case of 'can'

4.1 The account in outline

The basic idea of the anti-Humean semantics is that 'can' is used to ascribe potentialities. But not any potentiality is relevant in any context. So, more precisely, 'can' is used to ascribe *relevant* potentialities, and context determines which potentialities are relevant. We will examine conditions for relevance in more detail below. But it is worth stating outright what the three observations from the metaphysics of potentiality will be good for in the semantics of 'can'.

Potentialities come in degrees: this observation has a double purpose. First, it helped us introduce potentialities that we would not ordinarily ascribe as dispositions: for instance, my desk's potentiality to break. So we can count the sentences 'My desk can break' as true in virtue

¹⁷Or perhaps it ascribes to Frank an especially fleeting potentiality, the potentiality to reach the finishing line by 4.04pm on 2nd August 2012. I have not given identity conditions for potentialities, and I will not do so in what follows. I am concerned only with the truth of the potentiality ascriptions, and some general explanatory relations between them.

of the desk's potentiality to break, even if 'The desk is fragile' seems false. Second, degrees account for some contextual variation. A potentiality that is ascribed in a given context may need to have a certain minimum degree. 'The bridge cannot break' may be true in a number of practical contexts where we do not encounter greater risks to the bridge than trucks crossing it, but false in a wartime scenario where the risks include bombs and such-like dangers.

Potentialities can be intrinsic or extrinsic: this observation will play a key role in accounting for the contextual variation of 'can' statements. In particular, it accounts for what is often referred to as the distinction between ability-ascribing and opportunity-ascribing uses of 'can', or general and specific ability. The basic idea is that what would ordinarily be counted as a possibility or opportunity-ascribing use of 'can' is simply an ascription of an *extrinsic* potentiality. And as there are gradations in the distinction between intrinsicity and extrinsicity – I have called the spectrum one of *granularity* above – so there are gradual variations in uses of 'can', from the ascription of a maximally fine-grained potentiality to that of the most coarse-grained extrinsic potentialities.

Potentialities change over time: this, and the related observations, will serve a double role. First, it goes into the formulation of the truth-conditions themselves, which need to take account of time and tense. Second, it helps us understand why some contexts favour the ascription of intrinsic, and others the ascription of extrinsic potentialities: at least in some cases, this is a matter of our interests being long-term or short-term.

Before we look at these points in more detail, we should consider the general form of the truth-conditions for 'can' statements relative to contexts. Let a context include, as is usual, at least the speaker, time, and place of the utterance, but also some facts about the interests and informational backgrounds of the participants, and let t_C be the time parameter of a given context C . Then

(POT) 'x can Φ ' is true in a context C iff, at t_C , x has a potentiality to Φ that is relevant in C .

The context-sensitivity of 'can' is captured by varying conditions for a potentiality to count as relevant.

On its simplest reading, (POT) exhibits the same quantificational structure that a possible-worlds semantics for 'can' does: existential quantification. The difference is that (POT) quantifies over a special class of properties, potentialities, where possible-worlds semantics quantifies over a special class of objects, worlds. To make this more explicit, we might rephrase (POT) as

(POT*) 'x can Φ ' is true in a context C iff, at t_C , the following holds: there is a property P such that P is a potentiality to Φ , P is relevant in C , and x has P .

Meta-linguistic talk of relevance in (POT*) is merely a way to capture the varying restrictions on the domain of the existential quantifier. It is open to the defender of (POT*) to formalize this quantification over properties as either first-order quantification over abstract objects, or as second-order quantification. In the former case, but not in the latter, a special relation of 'having' or instantiation will be needed.

For those who object quite generally to quantifying over properties, first- or second-order, an alternative paraphrase of (POT) can be provided: take 'has a potentiality to be Φ ' as an unanalysable predicate with no quantificational structure indicated by 'a', or alternatively reformulate it as 'is potentially Φ '. The relevance restriction, instead of being part of the quantificational structure, then becomes adverbial: we cannot predicate contextual relevance of a potentiality, but

we must rather say of x 's having-the-potentiality that it happens in the contextually relevant way. Say that x is *C-relevantly* potentially Φ just in case x 's being potentially Φ happens in the right way to be relevant in context C . Then (POT) becomes

(POT)** ‘ x can Φ ’ is true in a context C iff, at t_C , x is *C-relevantly* potentially Φ . (or: x *C-relevantly* has a potentiality to Φ).¹⁸

A further noteworthy feature of (POT) and its reformulations is their relativization to times. As we have seen, objects lose and gain potentialities with time. For instance, I once had some potential to become a child prodigy, but I no longer have that potential; before the invention of the computer, no one had the ability to access the internet, but now most of us do. The degrees of potentialities change too – a glass becomes more fragile when it acquires a small crack, and practice increases the degree to which we possess various abilities.

It is vital, then, that the potentiality ascribed is possessed and of the relevant kind *at the time* of the ascription, not before or after that time. In saying ‘The vase can break’, I am ascribing to the vase a potentiality to break, of the relevant kind, possessed *now*, at the time of utterance; in saying ‘I can play the piano’, I claim that I possess the relevant ability now. The truth-conditions for ‘can’ statements take care of this by relativizing to the time parameter of the context of utterance, t_C .

In so doing, the truth conditions given in (POT) and its reformulations also provide for tensed ‘can’ statements. For the past tense, simply replace the temporal clause ‘at t_C ’ with ‘at a time t prior to t_C ’; for the future tense, replace ‘at t_C ’ with ‘at a time t after t_C ’. Or else, if you are an A-theorist and reluctant to capture the tenses of ‘can’ with time-indices t and t_C , prefix the whole right-hand side of (POT) or its successors with the relevant tense operator ‘it was the case that ...’ or ‘it will be the case that ...’. The potentiality semantics can go either way.

How, then, do we express tensed ascriptions of potentiality? For the past tense, we have two options: ‘could’ and ‘could have’. (‘Could’ has a second and distinct function as the subjunctive form of ‘can’, more about which in section 5.¹⁹) The two expressions differ in that the latter, but not the former, appears to carry an implication (or perhaps only an implicature) of the past potentiality not being exercised, as is witnessed by the following pair of statements:

- (2) a. Mozart could play the piano while blind-folded (and he did so on many occasions).
 b. ?Mozart could have played the piano while blind-folded (and he did so on many occasions).

¹⁸The question whether to adopt (POT*) or (POT**) is not simply the question whether to be a realist or a nominalist about potentialities. Most anti-Humeans are realists, but Whittle (2009) has recently suggested that there is a nominalist version of the anti-Humean ‘causal theory of properties’ available, which reduces each property to a causal profile as expressed in a Ramsey sentence. Note that Whittle’s causal nominalist is not afraid to quantify over properties since she is ‘not denying the existence of properties, [she is] just claiming that they are not sui generis entities. Consequently, since Ramsey sentences do not presuppose any particular ontological analysis of properties, causal nominalists can utilise them just as other causal theorists can.’ (Whittle 2009:247) However, causal nominalism, since it relies on the notion of a causal or modal profile in reducing properties, is in tension with the idea driving the anti-Humean semantics I am presenting: that our modal talk ultimately comes down to the ascription of modal properties.

¹⁹That the two uses really are distinct, can be seen from the fact that they have distinct translations in other languages (e.g., ‘konnte’ and ‘könnte’ in German). Note that ‘could’ also has a life of its own as an expression of epistemic possibility, as for instance in ‘She could be home by now.’

If (2-b) is semantically bad, then the assumption of non-exercise is part of the truth-conditions of ‘could have’ statements and should be included in them. If (2-b) is only pragmatically bad, then the assumption is a mere implicature and should, accordingly, not be written into the truth-conditions. Again, the potentiality semantics can go either way.

There is no distinct future tense for ‘can’, but like other English verbs, ‘can’ itself sometimes functions as a future tense, as in (3-a), which is paraphrased by (3-b):

- (3) a. This time next year, I can go on a long vacation.
 b. This time next year, I will be able to go on a long vacation.

Where ‘can’ is semantically future-tensed, the right truth-conditions will, of course, have to be appropriately tensed or time-indexed too.

We must, again, be careful to track the scope of a temporal modifier. In (3-a), the expression ‘this time next year’ modifies the ‘can’ statement as a whole. It is therefore construed to date the time of the potentiality’s possession. But temporal modifiers may occur in the scope of ‘can’, as for instance in

- (4) a. I can type a page in two minutes.
 b. I can be home by 8pm.

In these examples, the temporal modifiers are naturally read to specify what exactly it is that the speaker can do: typing a page within two minutes, of being home by 8pm. The potentialities ascribed must therefore have a temporally specified (or specifiable) manifestation. We have seen examples of such potentialities in section 3: (4-a) ascribes a potentiality of the same type as Frank’s ability to run a mile in four minutes, while (4-b) ascribes a potentiality of the same type as Frank’s ability to be at the finishing line by 4.04pm. The former specify a time interval, the latter only an end-point.²⁰

So much for the general form and structure of the truth-conditions. A crucial factor in (POT) as well as the reformulations was the appeal to *relevant* potentialities. We will now go on to consider these in some more detail.

4.2 *Relevant potentialities*

We have seen in section 3 that potentialities vary along at least two axes: their degree, and their fineness of grain. Both turn out to be crucial in understanding the context-sensitivity of potentiality ascriptions. I will take them up in turn.

On a potentiality-based semantics, ‘x can break’ works in much the same way as does ‘x is fragile’, sketched in the previous section. Both ascribe to x a potentiality to break, but both are selective about the kind of potentiality that they ascribe. Just as ‘My desk is fragile’ is false in many contexts, so ‘My desk can break’ will not be true in all contexts: both statements require the

²⁰(4-b) and similar examples might seem to spell trouble for the potentiality semantics: it specifies, within the scope of ‘can’, what looks like a dated event rather than a general property. But the manifestation of a potentiality, on a standard anti-Humean metaphysics, should be a property. I cannot fully address that worry here but I have indicated a response at the end of section 3: the potentiality with an apparently dated manifestation is just a redescription of (or, at any rate, based on) a potentiality with a non-dated manifestation, whose manifestation involves doing something within a given *interval*. In the case of (4-b), this might be, say, a (specific/extrinsic) ability to run one’s errands and cover a distance of 10km within 6 hours, if the sentence is uttered at 2pm at a distance of 10km from the speaker’s home.

ascribed potentiality to have a certain minimal degree. It would seem, however, that the threshold set by 'x can break' is lower than that for 'x is fragile'. In many ordinary contexts, I would be prepared to say that my desk can break though it is not fragile. Perhaps a closer analogy is with more regularly formed disposition terms such as 'breakable'. I, at any rate, cannot detect any difference in the threshold degree required for 'x is breakable' and that required for 'x can break'.

A more notable difference between 'can' and disposition ascriptions relates to intrinsicity or granularity. Typically, dispositional terms (terms of the form ' Φ -able' and related terms) ascribe potentialities that are very close to the intrinsic or maximally fine-grained end of the spectrum I have described towards the end of the last section: 'x is breakable' does not become false when the object x is packed in anti-deformation packaging, nor does it become true when the object is put in front of a bulldozer, but in some contexts the truth value of 'x can break' may change with such circumstances. Dispositional terms, it seems, typically come with a strong and relatively stable implication of intrinsicity which is held fixed across contexts. Even terms for extrinsic dispositions, such as 'vulnerable', will be quite selective and, more importantly, quite fixed in the kinds of external circumstances that are relevant for the property they are used to ascribe. 'Can' is much more flexible in this respect, and accordingly more sensitive to our interests in a given situation.

Suppose I am moving to a new flat and considering where to store my valuable vase on the moving van. Since I have taken care to pack the vase in anti-deformation packaging, it is perfectly natural to say 'the vase cannot break, it is so safely packed', thus denying the vase an extrinsic (and otherwise relevant) potentiality to break. In another context, say, considering where to put the vase in my new flat, I may then switch to the more intrinsic potentialities and say 'The vase should be in a safe place, it can break so easily'. In the first case, my practical interest is in the extrinsic or relatively coarse-grained potentialities of the vase. After all, the more extrinsic a potentiality, the more possible interferences with its manifestation are taken account of. My vase may have the potential to break to a great degree but since it is so safely packed, I need not worry about its breaking for the moment. As things stand, we interact not with the vase on its own but with the vase plus packaging; and it is our interactions with the things I am moving that are currently of significance. In the second case, on the other hand, the long-term interest brings with it an interest in the vase's more fine-grained (intrinsic) potentialities because these are generally more permanent. As we have seen in section 3, intrinsic (or more fine-grained) potentialities are typically more stable over time than extrinsic (or more coarse-grained) potentialities. So it is not surprising that the nature of our interests – long-term or short-term – is one determining factor in selecting the fineness or coarseness of grain that is required of a relevant potentiality in a given context.

In some cases, our practical interests underdetermine the requirements on relevant potentialities. In such contexts, the guiding principle may simply be what Lewis has called a 'Rule of Accommodation': *ceteris paribus*, context fixes the relevant values so that the utterances made in it come out true (Lewis 1979:347). Thus of a drunk swimmer, we may say 'She can swim', ascribing to the swimmer the maximally fine-grained (and otherwise relevant) potentiality to swim; or we may say, 'She cannot swim', denying her the overall intrinsic (and otherwise relevant) potentiality to swim. Of a well-trained and sober swimmer who is tied to a chair we may say 'She can swim', ascribing to her the intrinsic (and otherwise relevant) potentiality to swim, or we may say 'She cannot swim' denying her the extrinsic (and otherwise relevant) potentiality to swim that is based in her joint potentialities with relevant objects of her surrounding. Finally,

as philosophers interested in determinism we may say of a competent, sober, and unimpeded swimmer who did not, at a particular occasion, swim: ‘She could have swum’, ascribing to her an intrinsic or a mildly coarse-grained potentiality, taking into account only objects of her closer surroundings at the time. Or we may say that, assuming truth of determinism and the fact that she did not in fact swim, ‘She could not have swum’, denying her the maximally coarse-grained potentiality to swim.

Not all sentences vary as freely in the required granularity as does our example ‘She can swim’. Consider our earlier examples of intuitively opportunity- or possibility-expressing sentences:

- (5) a. You can buy a kettle in that store.
 b. You can fall off the cliff if you’re not careful.

Neither of these has a plausible reading that ascribes to the sentence’s addressee an intrinsic potentiality (to buy a kettle or to fall off the cliff). But that should not come as a surprise. Both sentences ascribe potentialities whose manifestations consist in a particular relation (buying a kettle in ..., or falling off ...) to a particular object (‘that’ store, the cliff that is contextually relevant). Potentialities of this kind are generally extrinsic. Consider a key’s potentiality to open a particular door *d*, or my potentiality to see you. The key would lose its potentiality if the door ceased to exist or merely had its lock changed, and I would lose my potentiality if you no longer existed or became invisible. A potentiality to stand in relation *R* to a particular object *b*, as possessed by an object *a* distinct from *b*, is always extrinsic, for it depends on the existence of *b*, on the intrinsic potentialities that *b* has, and on the relations that hold between *a* and *b*. (As I have argued in section 3, such an extrinsic potentiality of *a* must arise from a potentiality that is possessed jointly with *b*.) Both our examples are of this kind: they ascribe extrinsic potentialities that depend on the existence and the potentialities of another object (the store and the cliff), as well as the relation in which the addressee stands to them. In general, the present approach treats ‘can’ statements that appear to express opportunities or possibilities as ascriptions of *extrinsic* potentiality.

Degrees and, more importantly, fineness of grain account for a great deal of context-sensitivity, but not for all. A third factor that is of great importance may be labelled *agency*.

In a great many contexts, when confronted with a sentence ‘S can Φ ’ where ‘S’ denotes an agent and Φ is a verb of action, we understand ‘can’ to ascribe to an agent not just any potentiality, but an ability, capability or rational capacity in a stronger sense. Thus when I say ‘I can play the piano’, what I say is at least misleading, and more likely false, if I possess merely the general potentiality to play the piano but not the skill or know-how that is acquired by lessons and practice. And when I say ‘I can hit the bull’s eye’, what I say is taken to be false if I’m a hopeless darts player who hits the bull’s eye every now and then by sheer accident (Kenny 1976).

This way of construing the relevant ‘can’ sentences (with agentive subject terms and predicates) is natural but not mandatory. Consider David Lewis’s well-known discussion of the sentence ‘I can speak Finnish’:

An ape can’t speak a human language—say, Finnish—but I can. Facts about the anatomy and operations of the ape’s larynx and nervous system are not compossible with his speaking Finnish. The corresponding facts about my larynx and nervous system are compossible with my speaking Finnish. But don’t take me along to Helsinki as your interpreter: I can’t speak Finnish. (Lewis 1976:77)

Unlike an ape, Lewis has the potentiality to speak Finnish. The contrast together with a principle of accommodation manipulates the context so that Lewis's potentiality to speak Finnish counts as relevant. Without the contrastive preparation, it would be difficult to hear the sentence as true; in ordinary contexts, the presumption that an ability in the stronger, agentive sense – a capacity, a skill – is ascribed with a sentence such as 'I can speak Finnish' is very strong.

Abilities in this strong sense, on the anti-Humean metaphysics that I have sketched, are a kind of potentiality. But what kind? What sets them apart? This is a difficult question, which cuts across the distinction between Humean and anti-Humean metaphysics.

On one tradition that goes back at least to G.E. Moore, abilities are related to *conditionals* of the form 'If x wanted (decided, chose, intended, or tried) to Φ , then x would Φ '. The conditional approach has faced a number of objections, most famously from Austin (1961) and Lehrer (1968). It has recently made a comeback in the form of a 'New Dispositionalism', defended by Vihvelin (2004) and Fara (2008). For the New Dispositionalism, an ability is tantamount to a disposition to Φ if one wants (decides, chooses, intends, or tries) to Φ . The dispositional approach solves some of the problems that the original conditional account faced, but it is a matter of dispute whether it solves all of them.²¹ If it does succeed, then its success is independent of whether it is read in a Humean fashion – with the preferred analysis of dispositions – or in an anti-Humean fashion with irreducible dispositions.

Another tradition, which goes back at least to Ryle (1949), holds that abilities are characterized by being particularly *multi-track*. An ability is not simply an ability to do one thing; it is systematically related to abilities to do similar things, and to abilities to do the same thing in a number of different circumstances. As Smith (2003) points out, if I have the ability to answer one logic question correctly, I will have the ability to answer other logic questions. I will also have the ability to answer the question in a number of different kinds of circumstances. While Smith spells this out in terms of possible worlds, the anti-Humean metaphysics can easily accommodate the basic idea: to have an ability (to Φ) is not just to have one potentiality (the potentiality to Φ), but to have a cluster of related potentialities (the potentialities to Φ' and the potentiality to Φ'' , the potentiality to Φ in conditions C and the potentiality to Φ in conditions C' , and so forth).

A third tradition, going back at least to Thomas Reid and more recently championed by Steward (2012), thinks of abilities as 'two-way powers'. To have an ability to Φ requires having an ability *not* to Φ , or an ability to refrain from Φ ing. Again, this can be spelled out in terms of possible worlds or in terms of potentialities. For the anti-Humean proponent of this view, to have an ability to Φ is not just to have a potentiality to Φ but also to have a potentiality not to Φ , or to refrain from Φ ing.

It does not matter for present purposes which, if any, of these conceptions is correct. What matters is that some potentialities – such as a dart player's ability to hit the bull's eye – count as abilities in some stronger sense, while others – such as my own potentiality to hit the bull's eye – do not. Exactly how that distinction is captured is a question independent of the choice between Humean and anti-Humean metaphysics. And whatever it is that sets abilities apart from other potentialities will, in some contexts, be among the conditions for a potentiality to count as relevant. This I call the factor of *agency*.

We thus have three factors that make for the relevance of a potentiality in a given context: degrees, granularity, and agency. There may be other factors. But those three are certainly central, and they account for a great deal of variation in the truth-conditions of 'can' statements.

²¹For a thorough criticism, see Clarke (2009), who also introduces the label 'New Dispositionalism'.

5 Dynamic modality beyond ‘can’

I have so far focussed on ‘can’ for two reasons. First, it is most favourable for a potentiality semantics due to its use in ascribing (intrinsic) abilities. Second, it is the most common expression of dynamic modality, and dynamic modality is the species of modality on which an anti-Humean semantics ought to focus. The discussion of ‘can’, however, has provided the resources to deal with other expressions of dynamic modality: the modal auxiliaries ‘might’, ‘may’, ‘must’ and ‘would’, the modal verbs ‘be able to’ and ‘have to’, the suffixes ‘-able’/‘-ible’, and the adjectives ‘possible’ and ‘necessary’ as they occur in ‘it is possible/necessary for ... to ...’. I will not treat sentence adverbs and other sentence-modifying constructions (‘possibly’ and ‘it is possible that ...’). As we have seen in section 2, those typically express epistemic, not dynamic, modality. (The relation between dynamic and epistemic modality will be considered in section 6.) Throughout the discussion of this section, the paradigmatic case of ‘can’ will serve as a useful point of reference and contrast. Many considerations that we have developed with a view to ‘can’ will carry over to other modal expressions, so we can be much briefer in this section.

We begin with expressions of dynamic possibility other than ‘can’. These include: the modal verb ‘be able to’, the suffixes ‘-able’/‘-ible’, the adjectival construction ‘it is possible for ... to ...’, and some uses of ‘may’ and ‘might’. Like ‘can’, these will be treated as ascribing potentialities to the sentence’s subjects; the truth-conditions for sentences including them follow (POT) and its reformulation. They will, that is, be of the general form

(POT) ‘...’ is true in a context *C* iff, at t_C , *x* has a potentiality to Φ that is relevant in *C*,

with the right kind of construction replacing the blank ‘...’. Where these other expressions differ from ‘can’ and from each other, they do so in the general conditions that they impose on relevant potentialities. Such differences, as we shall see, lie mostly in the dimension of agency, though sometimes also in the requirements concerning granularity.

The verb **‘be able to’** is closest to ‘can’ and sometimes even used to supply grammatical forms that the auxiliary ‘can’ does not have²². We made use of that fact above in paraphrasing sentence (3-a). However, there are some differences between ‘can’ and ‘be able to’, both with respect to agency and with respect to fineness of grain. ‘Be able to’ seems more closely tied to agency than ‘can’: it sounds infelicitous when used with non-agentive subjects or predicates (witness (6)). It also appears to be more closely tied to extrinsic potentialities, where ‘can’ is neutral or, in the absence of further context, more naturally read as ascribing an intrinsic potentiality (witness (7)):

- (6) a. The vase can break.
- b. ?The vase is able to break.
- c. The boy can fall off the cliff.
- d. ?The boy is able to fall off the cliff.
- (7) a. John can swim, though he is not able to right now.
- b. ?John is able to swim, though he cannot swim right now.

Next, we turn to the suffixes **‘-able’** and **‘-ible’**. These are not discussed much in the philosophical literature on modal semantics, but rather form the topic of a separate debate on dispositional predicates. As Mondadori and Morton (1976) and Kratzer (1981) note, however, they

²²See Palmer 1974:116, Coates 1983:126.

constitute an expression of modality which combines compositionally with other expressions, and should fall within the purview of a more general modal semantics. In general, the suffixes are appended to a verb (wash, (dis)solve, read) to yield an adjective (washable, soluble, readable). These adjectives in turn are naturally read as expressing potentialities: washability, solubility, and readability. Thus the *Oxford English Dictionary* tells us that the suffixes form 'adjectives denoting the capacity for or capability of being subjected to or (in some compounds) performing the action denoted or implied by the first element of the compound'.

The semantics of these suffixes differs from that of 'can' in two crucial ways, again connected to the two dimensions of agency and fineness of grain.

First, where 'can' through the dimension of agency has a certain affinity to what are traditionally called *active* powers, adjectives on '-able' or '-ible' are closely linked to *passive* potentialities or dispositions. To be Φ -able, typically, is to have a potentiality to be Φ ed. Thus to be washable, soluble, or readable, is to have a potentiality to be washed, dissolved, or read; and so on for most (not for all²³) adjectives of the kind.

Second, the suffixes tend to be tied to intrinsic potentialities. A text does not become unreadable in the dark, though it becomes true to say of it that it cannot be read; a sugar cube does not become more or less soluble by being at greater or lesser risk of being immersed in water. A little contextual variation is to be expected in their meaning; to be readable is to be capable of being read under *normal* conditions, to be washable is to be capable of being washed under *normal* conditions, and so forth. As normal conditions change, so do the meanings and extensions of those adjectives. But this contextual change is nowhere near the extreme flexibility exhibited by 'can'.

Further expressions of dynamic possibility include the '**possible for ... to...**' construction as well as the modals '**may**' and '**might**'. The latter two modals only rarely express dynamic modality. They are mostly used for epistemic possibility²⁴. 'Might', in particular, is the primary modal of epistemic modality. But as Stalnaker (1981) and others have noted,

might sometimes expresses some kind of non-epistemic possibility. *John might have come to the party* could be used to say that it was within John's power to come, or that it was not inevitable that he not come. (Stalnaker 1981:99)

On this reading, 'might have', like 'could have' ascribes a potentiality but it does so in the past tense (and with an implication or implicature of non-manifestation).

On the potentiality semantics, all of these expressions ascribe potentialities where they are used dynamically. They vary with regard to intrinsicity and extrinsicity in much the same way as 'can' does; but unlike 'can', they have no connection to the factor of agency. Contrast the following variations on sentence (8-a):

- (8) a. She can play the piano.
 b. It is possible for her to play the piano.
 c. She may play the piano.
 d. She might play the piano.
 e. She might have played the piano.

²³Exceptions include: 'honorable' and 'payable', which appear to have a deontic meaning, the latter atypically expressing deontic *necessity*; and 'capable', 'feasible' and others that have lost, as it were, their compositional nature.

²⁴Collins 2009:92, Table 4.2; 118, Table 4.10.

(8-b)

-(8-e) do not have the strong association with skill or ability that (8-a) does. (It is difficult to hear (8-c) and (8-d) as dynamic at all; (8-c) seems to express permission, and (8-d) an epistemic possibility, of her playing the piano. But even if they are read dynamically, however, there is no strong implication of skill or ability.) Apart from tenses, sentences (8-b)-(8-e) seem semantically equivalent.

The modals that I have looked at so far were modals of what is generally classified as dynamic possibility. But what about dynamic necessity?

Again, we must be careful to prize apart the dynamic reading from epistemic and deontic ones. The auxiliary ‘**must**’ and the verb ‘**have to**’ are most often used deontically (as in (9-a)) or epistemically (as in (9-b))²⁵:

- (9) a. He must/has to go to school.
b. This must/has to be where she lives.

But they have some dynamic readings. Consider, for instance,

- (10) a. I must sneeze.
b. She is obsessive-compulsive; she just *has to* wash her hands once every hour.
c. Like-charged particles must repel each other; it’s a law of nature.

Especially where the subject is agentive, a natural paraphrase uses ‘can’: what an individual must do is what she cannot help doing, or what she cannot refrain from doing. The aspect of agency, which we have seen to arise with ‘can’, is relevant here too. Here, however, it is not the agent’s control over her actions but her lack of control that is expressed in sentences (10-a) and (10-b). What the subject of these sentences is said to lack is the (intrinsic or extrinsic) *ability* to do other than sneeze or wash her hands. (10-c) does not carry such an implication of agency, but it too can be understood as the negation of a ‘can’ statement: like-charged particles cannot fail to repel each other; they lack the potentiality to do so.

A natural treatment for expressions of dynamic necessity, then, is *via* their duality with modals of dynamic possibility. A sentence of the form ‘x must Φ ’ or ‘x has to Φ ’ is true just in case x lacks a contextually relevant potentiality *not* to Φ . The requirements on relevant potentialities will be much the same as they are for ‘can’.

We now turn, finally, to **counterfactual conditionals**. In section 2, we had set aside the attempt to provide a semantics of ‘would’ counterfactuals in terms of a disposition’s stimulus and manifestation. The problem, recall, was that the disposition was neither sufficient nor necessary for the truth of the corresponding counterfactual conditional: a fragile vase may be wrapped in styrofoam, so that it is not true that it would break if it were struck; a non-fragile concrete block might be attached to an explosive so that it is true that it would break if it were struck. We now have the resources to answer this challenge: the ‘would’ counterfactual is tied not to the vase’s or the block’s *intrinsic* dispositions, but to suitably *extrinsic* ones. Thanks to its joint potentialities with the packaging material, the vase lacks an extrinsic disposition (of a high enough degree) to break if struck; thanks to its joint potentialities with the attached explosive, the concrete block has such an extrinsic disposition. The moral to draw is not that counterfactuals do not ascribe

²⁵See Collins 2009:34, Table 3.2; 60, Table 3.12.

dispositions, but that they do not (or only rarely) ascribe intrinsic dispositions.

What about another species of subjunctive conditionals, the 'might' or 'could' counterfactuals? On one approach²⁶, these are simply the *dual* or the corresponding 'would' conditional. Consider the three sentences in (11):

- (11) a. If John came to the party, he would enjoy himself.
 b. If John came to the party, he might enjoy himself.
 c. If John came to the party, he could enjoy himself.

(11-a)

ascribes to John a relevantly extrinsic disposition to enjoy himself if he came to the party. On the duality approach, (11-b) and (11-c) (when read dynamically) are equivalent to

- (12) It is not the case that: If John came to the party, he would not enjoy himself.

For the potentiality semantics, this is to say that (11-b) and (11-c), like (12), deny to John the relevantly extrinsic potentiality not to enjoy himself if he came to the party. However, this approach sits uneasily with other uses of 'could' and 'might'. We have treated those locutions as *ascribing*, not as *denying*, potentialities. A more congenial approach for the potentiality theorist is to read (11-b) and (11-c) as paraphrased in (13):

- (13) If John came to the party, it would be that: he might/could enjoy himself.

On this approach, 'might' or 'could' counterfactuals are treated not as duals of 'would' counterfactuals, but effectively as 'would' counterfactuals whose consequents are 'might' or 'could' statements. This reading is less widely accepted than the duality reading, but it is advocated (as one available reading) by Lewis (1973:63-65) and Eagle (2007).²⁷ (13), on the potentiality semantics, says that John has a relevantly extrinsic potentiality whose stimulus condition is coming to the party, and whose manifestation is the possession of another potentiality: the potentiality to enjoy himself. The potentiality ascribed by (13), in other words, is an *iterated* potentiality: it is a potentiality for the acquisition of another (relevant) potentiality.

This section has provided no more than the bare outlines of an anti-Humean semantics beyond 'can'. But it should give a feeling for how the semantics goes, and some hope that it will go well. Much work remains to be done. But the task looks to be rewarding.

6 Further issues

I have argued that the anti-Humean metaphysics of potentiality, when spelled out in sufficient detail, affords the materials to meet the main challenge formulated in section 2: to give an account of context-sensitivity that is general enough to cover, not only the ability uses of 'can', but also its possibility (or opportunity) uses, as well as contextual shifts between and within these. Given the dimensions of degree, granularity, and agency, I believe such an account can be given. Granularity, or in general the observation that there are extrinsic potentialities, has proved particularly useful in meeting the challenges. Using 'can' as a paradigm case, the prospects for

²⁶Advocated, for instance, in Lewis 1973.

²⁷Eagle (2007) labels this reading 'ontic' and suggests that it is 'more widespread than this single citation [Lewis 1973] suggests' (Eagle 2007:4, fn.5).

an anti-Humean semantics of dynamic modality in general look hopeful. In this final section, I want to address what I take to be the two main remaining issues for the proposed semantics. One concerns its expressive limitations, the other its systematic connection with flavours of modality other than dynamic.

6.1 All modality is *de re*

For the anti-Humean, the chief advantage of the semantics that I have so far described is the link that it provides between our modal talk and the underlying structure of modal reality – the modal properties that constitute the bedrock of anti-Humean metaphysics.

It is a consequence of this link that the anti-Humean semantics treats all (dynamic) modality as *de re*. In this, it is in sharp contrast with the more familiar approaches to modal semantics. For possible-worlds semantics, the smallest unit to which a modal operator (such as ‘can’) is applied is a *sentence*, such as ‘I play the piano’, to yield a complex sentence with the structure ‘Can (I play the piano)’. For the potentiality semantics, a modal verb such as ‘can’ is embedded more deeply in the structure of a sentence: it is applied first to a predicate (‘play the piano’) to yield a complex predicate (‘can play the piano’), which is then applied to a singular term (‘I’) to yield a sentence (‘I can play the piano’). What we do with such modal terms is ascribe modal properties to individuals. In this sense, all dynamic modality is *de re*.

As may be expected, problem cases for the potentiality semantics arise where there are no individuals for the modal properties to be ascribed to. This may be so because, while the sentence is syntactically of the right form, its subject is not best understood as denoting an object. Consider (14):

- (14) a. The debt rate can rise next year.
 b. My great-granddaughter can be a painter.

While (14-a) appears to ascribe a potentiality to an object referred to by ‘the debt rate’, many will doubt that there is any such object, or that, if it exists, it can function as a bearer of potentiality. And while (14-b) appears to ascribe a potentiality to an individual denoted by ‘my great-granddaughter’, it would seem again that there is no such individual, and there might never be. Nevertheless, it may be said, both sentences have a dynamic reading, and both sentences may well be true on that reading. So, the objection goes, not all ‘can’ statements that express dynamic possibility can be construed as ascribing a potentiality (or any other property) to an object.

A second type of problem concerns not so much the absence of suitable individuals for the ascription of modal properties, but targets the construal of modal statements as ascribing such properties more generally. For the potentiality semantics, all dynamic modality is *de re*; but, the objection goes, there are *de dicto* statements of dynamic modality, which are not concerned to ascribe a modal property to some individual or other. Consider

- (15) Someone can see us.

(15) has a *de re* reading. On that reading, it says that there is someone of whom it is true that they can see us; someone, that is, who has a potentiality (of suitable grain and degree) to see us. But (15), it may be said, also has a *de dicto* reading. On that reading, it says that it is possible for there to be someone who sees us. The *de re* reading is committed to the existence of someone, the potential seer; the *de dicto* reading is not. But if (15) was used, as the potentiality semantics has it, to ascribe a modal property, it cannot be neutral on whether or not there is someone to possess the

relevant property. Moreover, the *de dicto* reading requires 'can' to take scope over the quantifier in 'someone'. A sentence modifier such as 'possibly' can do that; but a predicate-modifying verb cannot. So, the objection goes, 'can' must be a sentence-modifier after all, in which case it is, again, less naturally construed as ascribing potentialities (or any other properties).

The two worries seem to be related, since modal sentences with the wrong kind of subject – as in (14) – are often analysed as *de dicto* modal sentences. That strategy, of course, is not available to the potentiality semanticist.

In responding to these worries, the potentiality semanticist has three basic options: acceptance, analysis, and rejection.

Straightforward *acceptance* of the examples in (14) entails ontological commitments: to abstract objects such as debt rates, to possible future objects such as my great-granddaughter (who may never be born), and to whatever else further examples may commit us to. Such liberalism is not unheard of. The debate about abstract objects is well-worn. The existence of *mere possibilia* has more recently found an eloquent defender in Timothy Williamson²⁸. For Williamson (2002), an object is 'essentially a locus of potential'. The accepting potentiality semanticist may take this literally.

With respect to *de dicto* quantified statements, straightforward acceptance is not an option. But the Williamsonian, believing as she does in the Barcan equivalence, has a *de re* substitute for each *de dicto* statement, and she may take to analysing the latter in terms of the former.

Analysis, quite generally, is an option that may be applied to both kinds of case. Let us begin with (14) again. True sentences with ontologically suspect subjects are not limited to modal language. Those who reject abstract objects will want to analyse not only (14-a), but also sentences such as

(16) The debt rate is rising.

They may do so by substituting, in the *analysans*, a different subject or subjects – debtors and creditors, in our case – for the suspect subject of the *analysandum*; and accordingly, a different but related predicate – e.g., lending and owing larger sums of money – to preserve the sense of the sentence. The same strategy may be applied, then, to our sentences above. In the *analysans*, we will refer to respectable objects – debtors and creditors, or myself – and ascribe to them suitably related properties. Only now the related properties will have to be potentialities: the joint potentiality to lend and owe larger sums of money, respectively; or my (iterated) potentiality to have a daughter with a potentiality to have a daughter with a potentiality to have a daughter with a potentiality to be a painter. Corresponding analyses can be applied to the allegedly *de dicto* statements.

Rejection is the final option, which may be applied judiciously or sweepingly. To reject the examples, we need not reject them as ungrammatical or false – we do say such things as (14) and (15). It is, rather, to reject them as falling within the purview of the proposed theory: *dynamic* modality. We have seen earlier that sentence modifiers tend to express epistemic modality. If a *de dicto* reading of statements such as (15) and, by the right analysis, (14) requires that 'can' be read as a sentence modifier, then so be it! But then the sentences must have an epistemic reading after all; or so the strategy of Rejection has it.

Rather than choose between the three strategies, I would like to end by following on a theme of the third, the relation between dynamic and epistemic modality. For this, it seems, is another

²⁸See Williamson 1999, Williamson 1998, Williamson 2002, Williamson 2010.

challenge to the potentiality semantics: to situate dynamic modality within the broader framework of linguistic modality in general, including as it does the epistemic and deontic flavours.

6.2 *Situating dynamic modality*

I have been careful throughout the paper to distinguish dynamic modality from other species of modality, and in particular from epistemic modality. The potentiality semantics has been developed for dynamic modality alone. But it is well known that the different species of linguistic modality – dynamic, epistemic, and deontic – are closely related. Most modal expressions can be used to express two or all three types of modality. That is hardly a coincidence. So what can the anti-Humean, potentiality semanticist say about linguistic modality in general?

There are certainly ways of fitting epistemic and deontic modality into an anti-Humean framework. Consider, by way of example, DeRose (1991)'s truth-conditions for a typical statement of epistemic modality:

S's assertion "It is possible that P" is true if and only if (1) no member of the relevant community knows that P is false, and (2) there is no relevant way by which members of the relevant community *can* come to know that P is false (DeRose 1991:593f., my italics).

We need not accept DeRose's account, but we can use it as an example to illustrate the relation between epistemic and dynamic modality. Clause (2) contains the dynamic modal 'can'. The potentiality semanticist will construe the sentence as denying members of the relevant community the relatively coarse-grained (extrinsic) ability to come to know that P is false. Both the relevant community and the exact extent of the ability's extrinsicality, as well as the ability's required degree, will be contextually specified and, presumably, highly flexible, thus accounting for some of the context-sensitivity of epistemic possibility claims. In this way, epistemic possibility becomes a matter of our extrinsic abilities to rule out a hypothesis. Knowledge itself, the core of clause (1), is sometimes linked to abilities. Virtue epistemologists such as Greco (2007) or Sosa (2007) take knowledge to be the exercise of certain abilities, while others, such as Hyman 1999, think of knowledge itself as an ability. Even when no appeal to abilities is made, virtually any account of knowledge appeals to some aspects of dynamic modality: the *reliability* of a method in process reliabilism, counterfactual conditionals in safety and sensitivity conditions, or easy possibility in Williamson 2000.²⁹

Obligations and rights, the subject of deontic modality, have recently been linked to dispositions in a series of papers by Luke Robinson³⁰. According to Robinson,

the metaphysical grounds of our moral obligations are dispositions (or powers), rather than (say) rules or laws. Specifically, they are *obligating dispositions*: real, irreducibly dispositional properties (powers, capacities, etc.) of moral persons—agents and patients—that can and do ground the moral obligations of moral agents without the metaphysical backing (so to speak) of duty-imposing moral rules or other moral laws. (Robinson 2013:6)

²⁹Alternatively, the relevant potentialities might be ascribed not to epistemic agents, but to their belief states. Thus *p*'s being epistemically possible for me might consist in my overall belief state's having a potentiality to update so as to include *p*. Thanks to an anonymous referee for this suggestion.

³⁰See Robinson 2011, Robinson 2013, Robinson forthcoming.

If statements of deontic modality could be construed as ultimately ascribing such obligating dispositions, we would get a thoroughly anti-Humean semantics of deontic modality to accompany the anti-Humean semantics of dynamic modality which I have presented.

Even if other species of modality can be incorporated in some such way, the anti-Humean semantics remains a disunified one. Take, for instance, the following sentences:

- (17) a. Frank can run a four-minute mile.
 b. It is possible that Frank runs four-minute miles.
 c. Frank might run four-minute miles.

The first, which is clearly dynamic, ascribes to Frank – the sentence's subject – a potentiality to run a four-minute mile. The latter two, both statements of epistemic possibility, deny the sentence's *speaker* and her community an ability to rule out that Frank runs four-minute miles. Similar considerations will apply to alternative construals of epistemic modality. Epistemic modality applies to a sentence as a whole ('Frank runs four-minute miles') and relates the proposition expressed by it to the epistemic state of the speaker or other subjects; dynamic modality is embedded into the very structure of the sentence, relating the object that is referred to by the sentence's subject to the property that is expressed by the following verb phrase. Even if both are a matter of potentialities, they differ fundamentally from each other.

This is in striking contrast to the more entrenched approach to modal semantics based on possible worlds. For possible-worlds semanticists such as Lewis and Kratzer, the distinction between dynamic and epistemic modality is no more a deep distinction than that between, say, the ability use and the possibility use of 'can'. Both are a matter simply of how we restrict the possible worlds over which a modal expression is taken to quantify: those which hold fixed certain actual facts (dynamic), those which hold fixed everything that is known by relevant subjects (epistemic), or those in which everything goes as it ought to go (deontic).³¹ Possible-worlds semantics provides unity where potentiality semantics sees deep differences. Unity may seem preferable, given that we use the same words for different types of modality. Is the price for the anti-Humean semantics therefore too high?³²

I do not think so. Metaphysically speaking, dynamic and epistemic modality appear to be two very different kinds of animals: one concerns reality, the other concerns, roughly, our knowledge of it. The distinction is not an artefact of the anti-Humean semantics. Rather, it was what motivated the semantics' initial focus on dynamic modality. In sharply distinguishing between the two (as well as between the dynamic and the deontic) types of modality, the anti-Human semanticist is guided by metaphysical considerations.

Unity of linguistic expression may have different sources. One source is unity in the underlying reality: all the phenomena described with the relevant type of expression have something in common. Another source may be unity in the pragmatic significance of the underlying reality:

³¹In Kratzer's semantics, this is complicated by the distinction between *modal base* and *ordering source*: dynamic and epistemic modality concern the former, deontic modality only the latter. But for our purposes, no such subtlety is needed.

³²Some developments in linguistics may suggest that the price is not high at all: many linguists see a deep divide, syntactic and semantic, between epistemic modality on the one hand and 'root' modality (including dynamic and deontic) on the other, and have argued that the difference is indeed one of scope: epistemic modals take scope over the sentence as a whole, while root modals are embedded 'further down' inside a sentence. This is precisely what the potentiality semantics would predict, at least for the case of dynamic and epistemic modality. See Brennan 1993 and Hacquard 2010 for discussion of the difference between root and epistemic modality.

while the phenomena described with the relevant type of expression differ from each other substantially, they play the same role for our deliberation, planning, and action. If we take possible-worlds semantics seriously, its diagnosis of the unity in modal language is of the first type. The anti-Humean semanticist should instead opt for the second type of diagnosis. Knowing that the vase *can* break (dynamic modality) or not being able to rule out that it *will* break (epistemic modality) both lead to the same result: I will pack the vase safely. A child's knowing that she is unable to do a cartwheel in the classroom (dynamic modality), and her knowing that she is not allowed to do a cartwheel in the classroom (deontic modality) both have the same result, at least in a rational and obedient child: she will not attempt to do a cartwheel in the classroom. Dynamic, deontic, and epistemic modality alike play the role of delimiting the space of options in our practical deliberation. Their metaphysics may be very diverse, and they may easily come apart in more sophisticated deliberation. But the basic function of the different types of modal knowledge is the same. It is not surprising, then, that a unified idiom has developed to express and share these different types of modal knowledge.

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Friedrich-Alexander-Universität Erlangen-Nürnberg
barbara.vetter@gmail.com